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THESIS

COMMUNITIES OF PRACTICE: TOWARDS LEVERAGING KNOWLEDGE IN THE MILITARY

by

Guillermo A. Palos

September 2007

Thesis Advisor:	Mark Nissen
Co-Advisor:	Karl Pfeiffer

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The Department of Defense has recently discovered the benefits of Communities of Practice as a Knowledge Management program in strategic, tactical, and staff environments. Such communities have grown in popularity – 185,000 users growing at 5,000 per month in over 6,000 registered Communities in the Air Force alone. However, their emergent manner and perspective is limited; an information-focused approach prevails, through which primary emphasis is placed on technology and document archives. This approach fails to address knowledge as a unique human feature. As a result, current implementations are unable to address intrinsic fundamental issues about knowledge that could improve the effectiveness of new and extant Communities of Practice. This thesis addresses the deficiency by investigating the characteristics of knowledge, Knowledge Management and Communities of Practice and proposing a socio-technical knowledge-focused approach for military functional communities. Findings are applied principally to the Air Force Manpower function and the Navy Security Cooperation activity, but results should also be generalizable to other functions/organizations, military Services and Department of Defense organizations trying to implement new Communities of Practice or enhance existing ones.

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COMMUNITIES OF PRACTICE: TOWARDS LEVERAGING KNOWLEDGE IN
THE MILITARY

Guillermo A. Palos
Major, United States Air Force
B.S., United States Air Force Academy, 1993

Submitted in partial fulfillment of the
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September 2007

Author: Guillermo A. Palos

Approved by: Mark E. Nissen
                 Thesis Advisor

                 Karl Pfeiffer, Lt Col USAF
                 Co-Advisor

                 Dan Boger
                 Chairman, Department of Information Sciences

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ABSTRACT

The Department of Defense has recently discovered the benefits of Communities of Practice as a Knowledge Management program in strategic, tactical, and staff environments. Such communities have grown in popularity – 185,000 users growing at 5,000 per month in over 6,000 registered Communities in the Air Force alone. However, their emergent manner and perspective is limited; an information-focused approach prevails, through which primary emphasis is placed on technology and document archives. This approach fails to address knowledge as a unique human feature. As a result, current implementations are unable to address intrinsic fundamental issues about knowledge that could improve the effectiveness of new and extant Communities of Practice. This thesis addresses the deficiency by investigating the characteristics of knowledge, Knowledge Management and Communities of Practice and proposing a socio-technical knowledge-focused approach for military functional communities. Findings are applied principally to the Air Force Manpower function and the Navy Security Cooperation activity, but results should also be generalizable to other functions/organizations, military Services and Department of Defense organizations trying to implement new Communities of Practice or enhance existing ones.

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I. INTRODUCTION AND BACKGROUND

This thesis investigates the issue of leveraging knowledge to gain a better understanding of how it can be harnessed towards improving organizational performance. It explores Communities of Practice as a structured "Knowledge Management" program and applies what is learned to the Air Force Manpower function and the Navy Security Cooperation activity. Knowledge-based organizational performance is important to these activities because both rely heavily on people with know-how who can build the value of the function by increasing its knowledge capital. Peter Drucker referred to this type of worker as "knowledge workers" because their worth, related to the "business intelligence" they possess, directly adds value to the organization. (Drucker, 1969, p. 263) The worker's knowledge is the primary asset for both activities. Through experience, learning, innovation and collaboration they are able to perform work to meet their Air Force and Navy mission.

The purpose of this research is to determine the best knowledge management program design for the community of knowledge workers in the Air Force Manpower function and the Navy Security Cooperation activity. In this first section, beginning with motivation, the chapter introduces the stimulus for this thesis, then turns to important background information, outlines the research scope and methodology, and summarizes the research questions. The benefits of the study follow in turn, and the chapter closes with a section summarizing how the study, as a whole, is organized and reported in this thesis.

A. MOTIVATION AND OVERVIEW

Knowledge is power, therefore an asset for people and organizations. (Nissen, 2006, p. i.x.) When harnessed, it enables performance and allows one to "predict and control events of the world." (Hayes-Roth, 2006, p. 23) In the military, this intrinsic knowledge (knowing-how) is a force multiplier leading to amplified physical power, and doing things better, faster, cheaper and in the most direct route. (Hayes-Roth, 2006, p. 23) Consistent with this perspective, the Secretary of the Air Force, the Honorable Michael W. Wynne, called all Airmen to be innovative and make excellence a hallmark and a

prevailing attitude. To achieve this, the Air Force implemented Air Force Smart Operations 21 to promote effective and efficient thinking, continuous process improvements and innovation in operations.[1] (SECAF, 2006 and 2007) Working smarter is now an imperative and requires knowing more, sharing more of what you know, creating more knowledge, applying what you know, continually refining what you know, and making better decisions faster. Leveraging knowledge, then, is a key ingredient to working smarter; therefore it should be a pivotal issue in the Air Force and Navy and is the overarching theme of this research.

Organizations and people benefit when knowledge moves within (i.e., learning), across or between them (e.g., communication or collaboration) because knowledge is required when and where work is accomplished. When people learn or organizations share know-how, as an example, knowledge is flowing. When it flows, learning is taking place, which enables action and workflows. Consequently, knowledge flows always lie on the critical path to organizational performance and a competitive advantage. (Nissen, 2006) However, the challenge is in that knowledge tends to be distributed unevenly (e.g., some have more experience than others), does not move on its own (e.g., not used or shared) and it moves slowly (e.g., experience comes with time and performance). Therefore, personal and managerial intervention is needed to promote knowledge flow, especially the tacit[2] type. Generally speaking, tacit knowledge offers more towards performance than does explicit knowledge[3]. Therefore it is more powerful, but also more difficult to manage.

At an abstract level, "Knowledge Management" can be characterized as a label for willfully "perceiving and addressing the issues raised by the importance and the availability of knowledge." (Rollet, 2003, p. 6) At a practical level, it refers to a range of

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[1] Air Force Smart Operations 21 is a leadership program to focus efforts "to maximize value and minimize waste" in AF operations. (SECAF, 2006) Launched on 8 Mar 2006 by a Secretary of the Air Force "Letter to Airmen" it was reenergized by a follow-up "Letter to Airmen" on 11 January 2007. (SECAF, 2007) More information can be access at the program website: http://www.afso21.hq.af.mil (can only be accessed using a dot mil account.)

[2] Tacit knowledge is deeply embedded in the individual; anchored with experience, beliefs, values, intuition, and learning. It is hard to express or communicate and difficult to make explicit but is easily demonstrated through actions and performance. "We know more than we can tell." (Polanyi, 1966).

[3] Explicit knowledge is more easily expressed and communicated. It can be codified and stored in various forms (e.g., documents or procedures).

practices used to create, organize, formalize, share, apply and refine organizational knowledge[4]. Scholars and practitioners (Garcia et al., 2005; Nissen, 2006; Rollet, 2003; and Wenger et al., 2002) have demonstrated that "Knowledge Management" is an indispensable program for promoting knowledge flows towards enhancing organizational learning, performance and value. One empirical study, conducted in 2006, suggests that it is worthwhile to utilize "effective knowledge management to create firm value." (Huang et al., 2006) It was determined, from a sample of 253 firms with KM programs, that there was a relative alignment between the firm's economic value and KM processes (creation, sharing and utilization of knowledge). In a 2004 Air Force Institute of Technology thesis research, Capt David Sasser surveyed DoD knowledge management experts to identify the major benefits associated with KM practice from a DoD perspective. Some benefits related to KM in DoD discovered in this study included: time savings in doing routine work; increased information content; improved teamwork; acceleration of processes; re-use of internal knowledge; increased employee motivation and enhancement of personal knowledge.

There is no one-size-fits-all "Knowledge Management" design. Each implementation should have a tailored fit addressing the uniqueness of the organization characterized by its environment. The literature abounds with methods and considerations for implementing a KM program. The common thread among these writings is that the tailored approach addressing the elements of the organization (i.e., people, processes, structure, and technology) is thought to be an effective means for laying a foundation for building a KM program upon. (Grant, 1996; Nissen, 2006; and Rollet, 2003) The tailored approach specifically brings together those elements in a strategic fashion to improve competitiveness, performance and value. (Lahaney et al., 2004).

Although there are a variety of approaches for managing knowledge, the scope of this research will limit attention to Communities of Practice (CoP) as a "Knowledge Management" program because they specifically address the extension of time and place (i.e., collaboration between geographically separated units) when it is an issue in an

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[4] Knowledge life cycle (create, organize, formalize, share, apply and refine) (Nissen et al., 2000).

organization. A CoP is described as a collaborative group of like-minded people focused on promoting learning, managing knowledge and nurturing new members. It rests on the expectation that interaction between participants leads to knowledge flow and learning. (Wenger et al., 2002) This expectation is interesting, serves as the premise to be explored and is the reason why a CoP was chosen as the knowledge management method to be examined in this research.

For Manpower, a CoP is an attractive approach because its knowledge workers are distributed across the Air Force across the world. As a result, time and space is a significant issue when accomplishing work. Additionally, it is an area that is currently dealing with knowledge management challenges. Formal initial skills training, on the job training, formalized organizational routines (i.e., continuity documents, regulations, archives and processes), and the personnel assignment process currently represent the extent of a knowledge management program. Consequently, knowledge is seldom reused, new members normally take years to spin-up, horizontal knowledge flows (e.g., between Major Commands (MAJCOM)) are nonexistent, vertical knowledge flows (e.g., between wing-MAJCOM-HQ USAF) are sluggish, redundant workflows exist, and knowledge tends to cluster in sub-function specialists (e.g., requirements determination, budget programming and strategic sourcing). Several recent significant events like career field restructuring, attrition and force reductions have reduced the pool of experience. Additionally, new accessions and a merger of the Manpower function with two other unique functions (Personnel and Services) have introduced a large pool of military who will be assigned to Manpower jobs with no Manpower experience.

The current manner of managing Manpower knowledge is inadequate as it is unsupervised and lacks strategic motivation and direction. Until now, no alternative has been presented or explored. Innovation is needed to better manage the function's key asset: knowledge. Under the light of AF Smart Operations 21, this function needs to examine a means to promote efficient thinking, and minimize effort and waste.

> There's no simple formula for becoming efficient thinkers. We need to practice efficient thought, and this means consciously planning, trying, learning, and starting again. (Hayes-Roth, 2006)

Similarly, for the Navy Security Cooperation activity, a CoP is an attractive approach because its knowledge workers are distributed across the world, across different organizations, across different chains-of-command and across different mission areas. Members performing this activity must constantly apply judgment, discretion and careful evaluation of issues and problems due to the nature and ramifications of unfavorable results caused by adverse actions. Involvement in international cooperative programs can be a delicate affair and requires members to have the knowledge to take action independently or know where to get it. Therefore, since the characteristics of this case – distributed community, time and place is an issue, member interaction is sought, and information and knowledge sharing is desired – fit well within the boundaries of what could be addressed by a Community of Practice, this case study is also included in this research.

B.   SCOPE AND METHODOLOGY

This thesis focuses on the area of Communities of Practice and what design is best to foster knowledge sharing, professional development through continuous learning, and community effectiveness toward the Manpower function and Navy Security Cooperation activity mission accomplishment.

This effort adds to our understanding of the implications on knowledge flow using a CoP design as a "Knowledge Management" program by investigating case studies of initiatives that experienced differing levels of effectiveness and growth. This is accomplished through review of academic literature and supplemented by interviews of active CoP knowledge managers. From this, characteristics of effective CoPs are discovered. It additionally sheds light on barriers and enablers to knowledge flow in and outside the environments studied.

Secondly, this thesis provides recommendations for a CoP design for the Air Force Manpower community and the Navy Security Cooperation activity by researching "Knowledge Management" and CoP methodologies found in academic literature. This provides a comparison of "Knowledge Management" architectures and frameworks towards shaping a fitting design adaptable in the military environments studied.

Finally, the author conducted qualitative interviews of "Manpower" and "Security Cooperation" practitioners to assess the possible people, cultural, organizational, process and technology factors that would affect the use of a CoP in their respective environments. This helps in considering these architectural components in a decision framework for a "Knowledge Management" program.

C.   RESEARCH QUESTION

What is the optimal community of practice design for the Air Force Manpower function and the Navy Security Cooperation activity? This thesis answers this question as the primary objective of this effort. However, it also addresses several other important questions that serve to strengthen this research:

- What is a Community of Practice and how does one function?
- What is knowledge and "Knowledge Management" and what relevance do they have on a Community of Practice?
- What value does a CoP offer to individuals?
- What value does a CoP offer to organizations?
- Are the two functions examined culturally ready to participate in a virtually supported CoP?
- What non-technical "Knowledge Management" interventions are needed to enhance innovation, learning, personal development and knowledge flow?
- What information technology interventions are needed to enhance innovation, learning, personal development and knowledge flow?

D.   BENEFITS OF STUDY

Organizations that instituted well designed and effective CoPs experienced many benefits: knowledge flow across organizational boundaries was promoted; communication and collaboration across an extension of time and place was enabled; rapid identification of members with specific knowledge/skills was supported; capture and reuse of existing knowledge was enhanced; people were able to solve problems quickly; the learning curve for new members was reduced; a safe environment for sharing problems; challenges and testing new ideas was provided; building of professional/social networks between community members was facilitated; and innovation was encouraged.

(Garcia et al., 2005; and Wenger et al., 2002) This represents an attractive value proposition for this research. The results of this study add to our understanding of the implications on knowledge flow using a CoP design as a "Knowledge Management" program. It additionally supports discovery of CoP characteristics to help identify what works and what does not.

Further, the results of this thesis are used to provide recommendations and considerations for the Air Force Manpower function and the Navy Security Cooperation activity to use in developing and cultivating a CoP for long-term success. Results were provided to Headquarters U.S. Air Force Directorate of Manpower, Organization and Resources (HQ USAF/A1M) and the Office of the Chief of Naval Operations, Director of Warfare Integration and Senior National Representative (OPNAV/N8F). It is anticipated that this research may be generalizable to other functions/organizations, military Services and DoD organizations trying to implement new CoPs or enhance existing ones.

E.   ORGANIZATION OF STUDY

Chapter II, Knowledge: The objective of this chapter is to provide a solid understanding of what is knowledge. Fundamental concepts about knowledge are introduced that are needed in later chapters to better understand and appreciate implementation of a "Knowledge Management" program and Communities of Practice.

Chapter III, Knowledge Management: The objective of this chapter is to provide a solid understanding of what is "Knowledge Management" by complementing the second chapter and turning to answer the question: "Why and how should knowledge be managed?" Fundamental concepts about KM are introduced that are need in later chapters to better understand and appreciate implementation of a Community of Practice.

Chapter IV, Communities of Practice as a Knowledge Management Program: The objective of this chapter is to provide a solid understanding of what is a Community of Practice, the value they provide an organization, frameworks and components of a CoP, and how they are implemented.

Chapter V, Designing a Knowledge-Focused Community of Practice: The objective of this chapter is to provide recommendations and considerations toward the

development of a CoP for the Air Force Manpower function and the Navy Security Cooperation activity. It introduces both areas to understand their characteristics and assess the potential for CoP success.

Chapter VI, Conclusions and Recommendations: The objective of this chapter to summarize the research, emphasize what has been learned and clearly discuss the concluding recommendations from the research.   The thesis concludes with recommendations for further study.

II.   KNOWLEDGE

Knowledge is valuable because it enables action and work. This second chapter explores this issue and answers the question: "What is knowledge?" Fundamental concepts about knowledge are introduced that are needed in later chapters to better understand and appreciate implementation of a knowledge management program and communities of practice. The first step toward harnessing knowledge for organizational performance is to have a clear understanding of what it is and the abstract and dynamic nature of its presence. The chapter begins by first introducing a working definition of knowledge to establish an overarching view of what knowledge is and to provide a point-of-departure for the key concepts that are discussed. The chapter then turns to examining several principles about knowledge that are specifically used as the "nails and screws" for building later discussions on knowledge management and communities of practice. The chapter closes with a look at the dynamic nature of knowledge, which transitions the discussion, for Chapter III, toward answering the question "why and how knowledge should be managed?"

A.   WHAT IS KNOWLEDGE?

What is knowledge? Many great thinkers have been intrigued by this question. Plato thought knowledge to be justified true belief. (Chappell, 2005) Albert Einstein said: "Knowledge is experience. Everything else is just information." (McDermott, 1999) King Solomon requested knowledge over everything else. He believed knowledge was power, providing sound judgment and worth more than "silver or the finest gold." (2 Chr 1 and Prov 8 Contemporary English Version) Michael Polanyi (1966, p. 4) viewed knowledge as deeply personal and embedded in the human mind from where "a harmonious view of thought and existence, rooted in the universe, seems to emerge." From this, he believed, our vision of the nature of things is shaped which we use to achieve a mastery of things.[5] These thoughts serve as a sampling that reflects the rich diversity of classical understandings about knowledge. Like Polanyi, many spend a lifetime trying to understand what it means. For this reason, this chapter is not intended

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[5] As quoted by the Polanyi Society found at: http://www.missouriwestern.edu/orgs/polanyi/.

to provide a definitive account of what knowledge is. Rather, it offers a working and pragmatic definition of knowledge fitting for understanding this thesis and relevant to practical knowledge management. By doing so, this chapter serves as a framework for sharing meaning about knowledge that is used in subsequent chapters.

We begin by first turning to Davenport and Prusak, and Nissen, whose works on knowledge management tie in classical thought on knowledge with elements of concern relevant in the contemporary organization. The following elucidates an abstract concept – knowledge – and begins to form it into something complex, but useful and of value for an organization.

> Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms. (Davenport and Prusak, 1998)

> Knowledge is required to perform knowledge and information work effectively, and such work drives organizational performance directly. Hence, knowledge drives organizational performance through the work it enables. To the extent that organizational knowledge does not exist in the form needed for application or at the place and time required to enable work performance, then it must flow from how it exists and where it is located to how and where it is needed. (Nissen, 2006)

Davenport and Prusak here describe what knowledge is and where it resides and Nissen adds its worth and how it should be used. The point is that knowledge is a mixture of various elements and has a fluid nature that needs to be harnessed for an organization to benefit from it. Drawing from this, the following working definition is developed to be used for this thesis:

> Knowledge is not data or information, but a complex feature of the human mind that is nourished by learning, decays from neglect, and is processed by a variety of human qualities, such as experience, judgment, values and beliefs. As such, it is hard to express explicitly in communication and documents, but is principally applied and observed implicitly through the action it enables, such as decision making, work and innovation. It is most useful when it flows across place and time, originating and terminating in a mind at work, to bridge gaps between current and desired performance.

The remainder of this chapter uses this as the platform to begin exploring this topic by developing further five key concepts infused in this definition and that are useful for constructing a knowledge management program:

1. knowledge is unique and is not data or information
2. knowledge resides in the human mind
3. knowledge exists in a tacit or explicit state
4. knowledge is perishable
5. knowledge must flow across place and time to be useful

B.   KNOWLEDGE IS UNIQUE AND IS NOT DATA OR INFORMATION

Knowledge is unique in relation to data and information because it is not interchangeable with them, it is scarce and it enables direct action. Considering its complexity and abstract nature, it may be difficult for organizations to fully appreciate this uniqueness since knowledge does not take on a physical existence. Grant (1996) points out that its presence is obvious where work is being accomplished; however, it is easy, and a common mistake, to misidentify it as information or data. For instance, one could credit a well prepared meal to a well written recipe. However, a written recipe is just information – perhaps data for those who have never stepped into a kitchen – and preparing a meal well requires previous experience in meal preparation. In another illustration, an office manager may believe having good data or a well designed information system as being the reason for their success. In both cases the presence of knowledge should be credited as what enabled performance. It is also equally likely to misidentify information or data as knowledge. A well written recipe may be referred to as the captured knowledge of the author when in reality it represents information that originated from the authors mind – explicated knowledge that was codified. Many believe that once knowledge has been expressed (e.g., documents or speech) it becomes information (Hildreth and Kimble, 2002; Miller, 2002; Svieby, 1997; and Wilson, 2002). Wilson (2002) explains that the misidentification of "knowledge" is primarily due to the confusion of "knowledge" as a synonym for "information."

Consider the common practice of labeling document archives – such as internet portals – as "knowledge-bases."[6] A web portal with hyperlinks to document resources is no more "knowledgeable" than a bookcase. Consider then that "knowledge-bases" in reality and in essence are virtual bookcases. McDermott (2001) goes so far as referring to them as "information junkyards" due to their unrestricted natural tendency to "pile-up" documents and information. A user is left to sift through the pile using keyword searches, hoping to spot usable resources. This may simply be an example of a semantic misapplication (use of the word "knowledge" rather than "information"), but it perhaps reflects a tendency to marginalize – albeit unknowingly – the power and uniqueness of knowledge, and its distinction from data and information. The intent here is not to likewise marginalize the value of data and information by "elevating" knowledge. On the contrary, in an organization, each element is important and contributes differently toward performance. Therefore, it is worth clarifying the distinctions further, which is important to understand when discussing practical implementation of communities of practice in later chapters.

Knowledge is not interchangeable with information or data. Each is unique. Table 1 provides a summary of what knowledge, information and data are. Compared to knowledge, information represents an idea conveyed that is useful only if it is processed by a mind with relevant knowledge. Data represents a discrete and atomic piece of a fact that is only useful if it is given meaning and processed also by a mind with relevant knowledge. Table 1 additionally addresses the relationship between knowledge, information and data. Knowledge emerges first and is useful by itself. Information emerges from knowledge and is useful when accompanied by knowledge. Data emerges from the availability of information and the presence of knowledge, and is useful with the right mixture of the two. (Tuomi, 2000)

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[6] A few examples of this include: Air Force Knowledge Now, Army Knowledge Online, Navy Knowledge Online, and Defense Knowledge Online.

Knowledge Entities	Description
Knowledge	Knowledge emerges first. It appears in the human mind at work and is formed by experience, ground truth, judgment, intuition, values and beliefs. It is scarce in comparison to data and information, but is more powerful because it enables action by itself.
Information	People form information using knowledge. Information may emerge from explicit knowledge that a person is able to express. It can also be constructed when knowledge is used to give data meaning. When formed it represents an idea conveyed to the mind. Information is abundant, but only actionable when accompanied by knowledge.
Data	Data emerges last, only after knowledge and information are available. Created as a solution to a practical problem, it represents a discrete and atomic piece of a fact. Data is extremely abundant, and is not actionable without the right mix of knowledge and information.

Table 1.   Knowledge-Information-Data relationship (After: Davenport et al., 1998; Nissen, 2006; and Tuomi, 2000)

Figure 1 illustrates the relationship between data, information and knowledge as a hierarchy. The elements cannot be touched, physically experienced and are not interchangeable. As a result, according to Hey (2004), we tend to develop a metaphorical understanding of them: "place data in storage," "drowning in data," "data streams," "information flows," "information overload," and "stores of knowledge." Although we don't actually "drown in data" or information does not "flow" in a literal sense, it does demonstrate a useful method of making concrete something that is otherwise ethereal. It's a familiar path toward making sense of our experiences with these concepts using other concrete experiences (such as with physical storage or with flows of fluids). This metaphorical view serves as a useful method to explore the distinctions between the elements. For practical purposes, this thesis avoids addressing higher order concepts such as wisdom, intelligence and insight, which are left for future study.
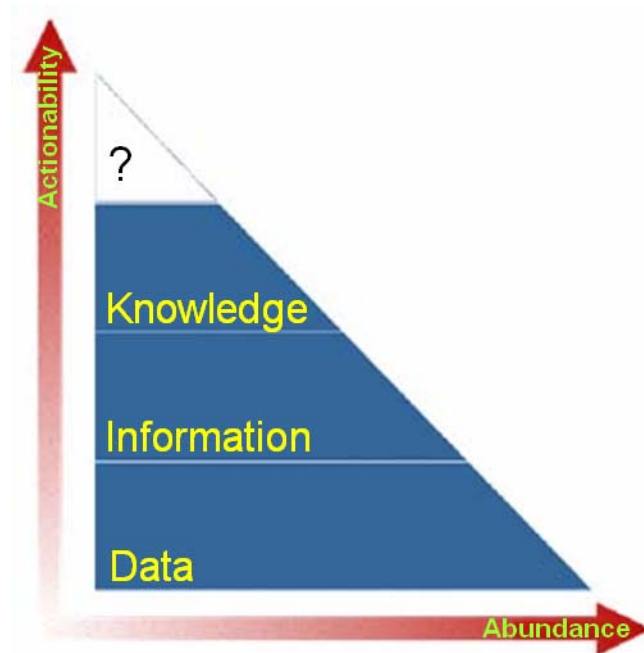
Figure 1.   Knowledge hierarchy (After: Nissen, 2006)

Knowledge is scarce in comparison to information and data. Turning again to Figure 1, data and information are depicted as covering a larger area of the knowledge hierarchy. This is meant to represent the relative abundance of data and information. In a recent study, IDC (2007) determined that information and data that was either created or captured in digital form in 2006 equated to 161 exabytes (161 billion gigabytes) and is projected to grow to 988 exabytes by 2010. Kelly (1999) believes that this exponential growth in data and information as being caused by the ubiquity of information technology. Hence, it is relatively easy now-a-days to produce data and information. Growth in computer to computer communication (e.g., the internet or organizational intranets) has also introduced a double edged sword. Referring to it as the current revolution, Kelly (1999) also calls this age the "Network Economy" which is characterized by accessibility to data, information, resources and services but also leads to the inevitable saturation of every space in our lives with data and information.[7]

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[7] One can turn to the emergence of Web 2.0 as evidence of a network economy. Web 2.0, also referred to as internet 2.0, is perceived as the second generation of the world wide web. It is not a technical update, but an update in the way the web is used. The focus is on exchange and sharing of information utilizing web services (e.g., eCommerce), social networking sites (e.g., MySpace), collaboration (e.g., Wikipedia) and sharing (e.g., blogs). (Scarff, 2006)

Perhaps this further explains what McDermott (2001) was referring to with his metaphor of "information-junkyards." Indeed, data and information are abundant. Often referred to as "raw data," it is the most abundant, thus data can "pile-up." Similarly, with information, we can experience "information-overload" when it "piles-up." In contrast, a discontinuity between data and information, and knowledge is that nobody ever complains of "knowledge-overload."

It is difficult to quantify the abundance of knowledge due to where it is found; in the human mind (section C addresses this second concept). In one study, Landauer (1986) ventured to measure the storage capacity of the human mind and concluded that the brain held about 200 megabytes of information. With something like 6.5 billion people on earth (CIA, 2007), that makes the total memory of all people on earth about 1,300 petabytes (1,300 million gigabytes). A limitation with Landauer's study is that it is only a measure of raw storage capacity and does not reflect a viable measure of knowledge in the human mind, not to mention it also does not reflect the power of knowledge potential. This does however provide reasonable evidence that the human mind is physically capable of storing large amounts of data and information[8] – adding to their abundance. Further investigation of academic literature revealed very little about the abundance of knowledge specifically. Verily, it is difficult to support the notion that knowledge is scarce. As a result, we are left to use anecdotal stories of individuals wanting to "gain more knowledge" or managers searching for "knowledgeable people." The constant pursuit for knowledge and knowledgeable people provides evidence that generally there is not enough knowledge (or the right type) to fully satisfy needs. The economic principle of scarcity also offers support. People assign more value to knowledge – than data and information – because it is less available. (Wikipedia, 2007a) For this reason, knowledge does not just "pile-up" to cause experiences of "knowledge-overload." Hence, when seeking to gain a competitive advantage, people and organizations try to cultivate existing knowledge or gain new knowledge to increase its abundance, because knowledge is scarce compared to data and information.

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[8] The IDC Study did not consider the amount of data and information stored in the human mind.

Knowledge is also unique because, unlike data and information, it enables direct action (Nissen, 2006). Referring one last time to Figure 1, the knowledge hierarchy depicts knowledge further up the "actionability" dimension than information and data. This can be explained by again distinguishing it from data and information. "Raw data" are symbols or observations of the state of the world. (Tuomi, 2000) It has to be "refined" to produce information. As information, it has been given form and can be processed by a human (i.e., in the qualitative form) or by a machine (i.e., in the quantitative form). It is no longer atomic since it can be characterized by its structure and the relationships it holds. Information has meaning, and may be more useful than data if something can be accomplished with it. For instance, in the military, "information superiority" is a strategic goal that leans on the belief that "harnessing" information and information networks leads to increased military performance. Alberts, Garstka and Stein (2000, p. 2), writing on Network Centric Warfare, explain this vision as: *"operations that generate increased combat power by networking sensors, decision makers, and shooters to achieve shared awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization....linking knowledgeable entities in the battlespace."* This illustrates a focus on "data and information flows" to achieve improved performance. It additionally introduces a subtle detail by pointing out that "information superiority" strives to link "knowledgeable entities." The entities referred to are people. Alberts, Garstka and Stein must precondition the entities with knowledge for the "information superiority" vision to work. Without knowledgeable entities, Network Centric Warfare is just a pipe for information and data to flow without considering the implications regarding the users. What is central here and is a pivotal point for this chapter is that knowledge enables direct action. Comparatively, "information provides meaning and context for such action (e.g., decision criteria, behavior norms, work specification). Data reduces uncertainty or equivocality (e.g., supplying parameters to an equation, providing numbers for a formula, specifying states in a relationship)." (Nissen, 2006 p. 26) Therefore, knowledge is more actionable than data and information, and knowledgeable people are able to perform tasks. Data and information provide a supporting role in performance, but are not central.

C.   KNOWLEDGE RESIDES IN THE HUMAN MIND

Knowledge resides in the human mind; therefore it is abstract and complex. It cannot be touched or physically experienced. Having a conceptual nature rather than a physical construct, it is generated through the agency of the human mind; a mind at work. (Housel et al., 2001, p. 2; and Davenport et al., 1998, p. 5) Although not every scholar agrees (e.g., Nissen, 2006; and Rollet, 2003), arguably, knowledge is part and parcel of human complexity and function which makes it difficult to fully apprehend and impractical, if not impossible, to emulate in machines or in documents. (Drucker (referenced by Konzter, 2001); Sveiby, 1997; and Wilson, 2002)

Consider that one would not say a machine or computer is "knowledgeable" because knowledge always involves a person who knows.   Knowing involves intelligence, intuition, discernment, judgment or experience; all of which are unique to the mortal mind. (McDermott, 1999, p. 105) A bookcase contains a lot of information in the form of books, but it lacks those human qualities that sprouts, nourishes and can make use of knowledge. Without a cognitive mental processing ability, books, bookcases and machines are no more than physical representations (like a snapshot) of true knowledge in someone's mind.

Once knowledge has been committed to a physical medium it becomes information. (Hildreth and Kimble, 2002; Miller, 2002; and Svieby 1997) This is not to say that books and machines are unappreciated (Chapter IV explores the supportive roles of documents and technology).   The point here is that knowledge involves human cognition, in some way, that originates from what Davenport and Prusak (1998) characterize as the components of knowledge. Table 2 summarizes these components; experience, ground truth, complexity, judgment, rules of thumb and intuition, and values and beliefs. These components are critical for making use of knowledge in the mind. They cannot be found in physical media. As such, knowledge then is a complex human feature that is nourished by a variety of human qualities making it a managerial challenge for an enterprise. Hence, understanding that knowledge resides in the human mind is the starting point toward applying effective managerial interventions using structured knowledge management practice.

Components of Knowledge	Description
Experience	Knowledge is nourished by what we have done or what has happen to us in the past.
Ground Truth	Knowledge is strengthened by knowing what really works and what does not.
Complexity	Knowledge is not rigid or excludes what doesn't fit; it can deal with complexity and variation in a complex way
Judgment	Knowledge judges and refines itself in response to new situations and information. It grows and changes as it interacts with the environment.
Rules of Thumb and Intuition	Knowledge has flexible guides to action that are developed through trial and error, and over long experiences and observations, which enables its possessors to deal with situations quickly.
Values and Beliefs	Knowledge is constructed and organized by values and beliefs which inescapably influence thoughts and actions, and determines what the knower sees, absorbs, and concludes from observations.

Table 2.   Components of knowledge (After: Davenport et al., 1998)

D.   KNOWLEDGE EXISTS IN A TACIT OR EXPLICIT STATE

Knowledge resides in the human mind principally in an implicit state which is difficult to note, but can also emerge in an explicit state that is much easier to observe. Nonaka (1991) considers these states as inseparable and mutually complimentary entities. Hildreth and Kimbel (2002) add that the observable and unobservable sates of knowledge interact with each other in the creative activities of a person. Principally, most scholars (to name a few: Polanyi, 1966; Nissen, 2006; Housel and Bell, 2001; Davenport and Prusak, 1998; and Wenger, McDermott and Snyder, 2002) work with what Housel and Bell (2001) categorize as the immanent and extant states of knowledge. Tuomi (1999) refers to this as the interaction between subsidiary and focal knowledge. Hildreth and Kimbel (2002) describe it as the "duality" of knowledge and refer to them as hard and soft components. All refer to something – knowledge – that is both held in a creative reserve out of sight (immanent, subsidiary or soft) and can also be manifested in a "visible" form (extant, focal or hard). What is out of sight is more typically referred to as implicit or tacit knowledge. The presence of tacit knowledge can be "observed" in the action it enables such as decision making and work. The more "visible" form is typically referred to as explicit knowledge. Table 3 summarizes these distinctions just made between tacit and explicit knowledge.

States of Knowledge	Description
Tacit	Tacit knowledge is deeply embedded in the individual; anchored with experience, beliefs, values, intuition, and learning. It is hard to express or communicate and difficult to make explicit but is easily demonstrated through actions and performance. "We know more than we can tell." (Polanyi, 1966)
Explicit	Explicit knowledge is more easily expressed and communicated. It can be codified and stored in various forms (e.g., documents or procedures). Once codified it ceases to be knowledge.

Table 3.   States of knowledge.

Can knowledge exist outside of the human mind? The thought that knowledge – the explicit type – ceases to be knowledge once it is expressed and codified is an unsettled controversy. There are those that believe that knowledge can be "captured" and instantiated in such things as documents (e.g., books, manuals or soft files), standards (e.g., processes, procedures or best practices) or software (e.g., databases, applications or web services) while maintaining the full or partial integrity of its state as knowledge. (Housel and Bell, 2001; Nelson and Winter, 1982; Nissen, 2006; Nonaka, 2000; and Rollet, 2003) For instance, Housel and Bell (2001) point out how knowledge can be owned, reflecting on the effort companies employ to protect valued knowledge using patents, copyrights and other legal mechanisms. Nissen (2006) also explains how expert systems[9] can apply explicit knowledge enabling them to take a performative role in an organization. Also consider the current trend across the Department of Defense for implementing "knowledge-bases," which provides some evidence of a prevailing belief that knowledge may be "captured" for reuse.[10]

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[9] An expert system is a "computer-based application that employs a set of rules based upon human knowledge to solve problems that require human expertise. They imitate reasoning processes based on the concept of information fit used by human experts in solving specific knowledge domain problems." (Marakas, 2002) Example applications: troubleshooting a problem in Microsoft Windows, diagnosing infectious blood diseases and recommending antibiotics using Mycin or for aiding analysis of data gathered during oil exploration using Dipmeter Advisor.

[10] Bartczak (2002) and Brooker (2006), in separate research efforts, studied knowledge management in the Department of Defense. Their work provides insight to help understand the extent of DoD efforts to capture and reuse knowledge.

Others believe that knowledge cannot be captured because it is intrinsically tethered to and inseparable from the human mind. (Fahey and Prusak, 1998; Miller, 2002; Polanyi, 1966; Sveiby, 1997; Wenger, McDermott and Snyder, 2002; and Wilson, 2002) Kotzer (2001) reported Peter Drucker as saying that "knowledge is between two ears, and only between two ears…it's really about what individual workers do with the knowledge they have. When employees leave a company their knowledge goes with them, no matter how much they've shared." Fahey and Prusak (1998) also wrote that one of the biggest errors organizations make in a knowledge management program is to try to disembody knowledge from the human mind and try to capture it. They believed this shifts the focus of knowledge and knowledge work away from individuals – "without whom knowledge can be neither generated, transmitted, nor used." Karl Sveiby (1997), who is believed to have written the first book on knowledge management in 1990, believes knowledge loses its "power" when it is treated like an "object" to be managed or captured. He described this as the "Information Focused" view of knowledge management where the value of knowledge comes out when it is made explicit in the form of information. A divergent view, he calls the "Knowledge Focus" view, is where the value of knowledge comes out when investment is made to leverage the knowledge in the human mind. (Sveiby, 2001)

Clearly there is a diversity of thought on this topic where further research is required. Indeed, as Nissen (2006) put it: "The distinction between explicit knowledge and information is subtle." Therefore, this research will use the "Knowledge Focus" view. The author believes this view will best appreciate the uniqueness of knowledge and information and complement a previous point made that neither are interchangeable. Using this view, the presence of explicit knowledge can be "observed" through expression such as discussions, monologs or documents. Once it is expressed it ceases to be knowledge and takes on the form of information (refer to section C). Expressed knowledge (information) does not enable action by itself. It needs to be processed by a knowledgeable person for it to be useful. For instance, a pilot can express his knowledge of flight by writing a manual. For the manual to be useful, a person reading it needs to have relevant experience and prior learning to make sense of the material. By itself, the manual contains information. When mixed with the relevant knowledge of a reader

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action can be taken (e.g., learning, decision making, or work). Therefore, knowledge resides in the human mind in a tacit or explicit state, and information can clearly emerge from it to further support performance.

Drawing again from Tuomi (1999), he describes the more tacit type of knowledge as a "background component" consisting of subliminal and contextual cues that we cannot be aware of. It acts as the necessary background against which all focal meaning – knowledge of the explicit type – is distinguished. There is no explicit knowledge without the background of its tacit state. Explicit knowledge, also, does not carry with it the same level of "power" that is characteristic of tacit knowledge. Nissen (2006) explains this saying that "knowledge made explicit often fails to enable the same level of performance corresponding to actions enabled by the tacit knowledge from which it is formalized." This insight serves to suggest that managers should consider more the tacit type of knowledge when seeking to improve performance because tacit knowledge offers greater potential in terms of competitive advantage than explicit knowledge does. Further, as knowledge becomes more explicit, its potency is diluted lowering its competitive potential. To help explain this further we turn to Figure 2. Depicted here are the states of knowledge (tacit and explicit) and the relative activities (e.g., knowledge processing or action) that occur throughout the knowledge domain. Tacit knowledge is illustrated as having a wider performance band for the wider range of actions it enables. Whereas, the explicit type of knowledge has a much narrower band of influence which is commensurate with what can be achieved with it alone. Hence, understanding that tacit knowledge is more powerful than the explicit type is important. Nevertheless, managers must consider both states of knowledge – tacit and explicit – when managing it. Also note that Figure 2 illustrates a unity between both states. When harnessed together, the effect that each state has on performance is amplified and enhanced. Therefore, both are significant and contribute distinctively toward organizational performance.
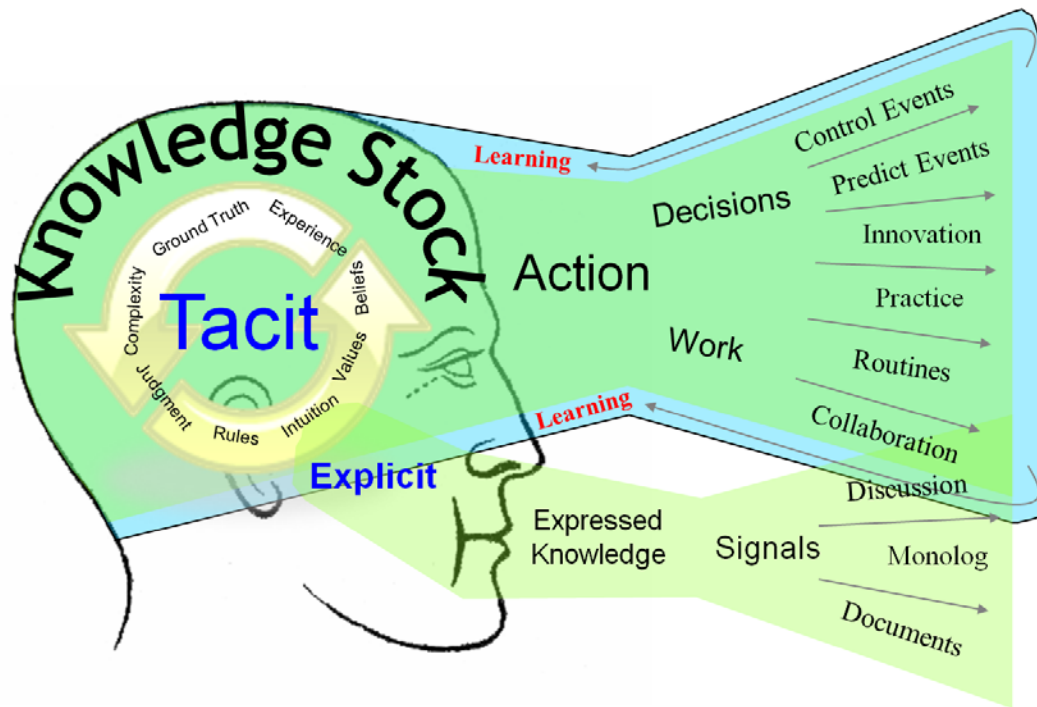
Figure 2.   Knowledge domain

E.   KNOWLEDGE IS PERISHABLE

Organizational knowledge is perishable because it is processor and time dependent, which represents a significant risk to an organization. Loss of knowledge is a loss of performance potential. This is depicted in Figure 3. The level of organizational knowledge increases through learning or gaining new people. Similarly, its level can decrease by loss of people or by the decay of knowledge. If the knowledge lost is relevant to sustaining or improving performance, or innovation then the organization incurs risk to current and future performance if the rate of outflow of knowledge is not matched by an equal rate of inflow of knowledge. Housel (2001, p. 5) explains that since knowledge resides in the human-head "when 'head count' is reduced, inevitably the sum of the knowledge within the organization is reduced, sometimes critically so."   This represents the problem managers have to address when confronted with employee attrition.   The loss of a high performance employee represents a significant loss of organizational knowledge, while the loss of an underperforming member may represent a marginal loss of organizational knowledge.
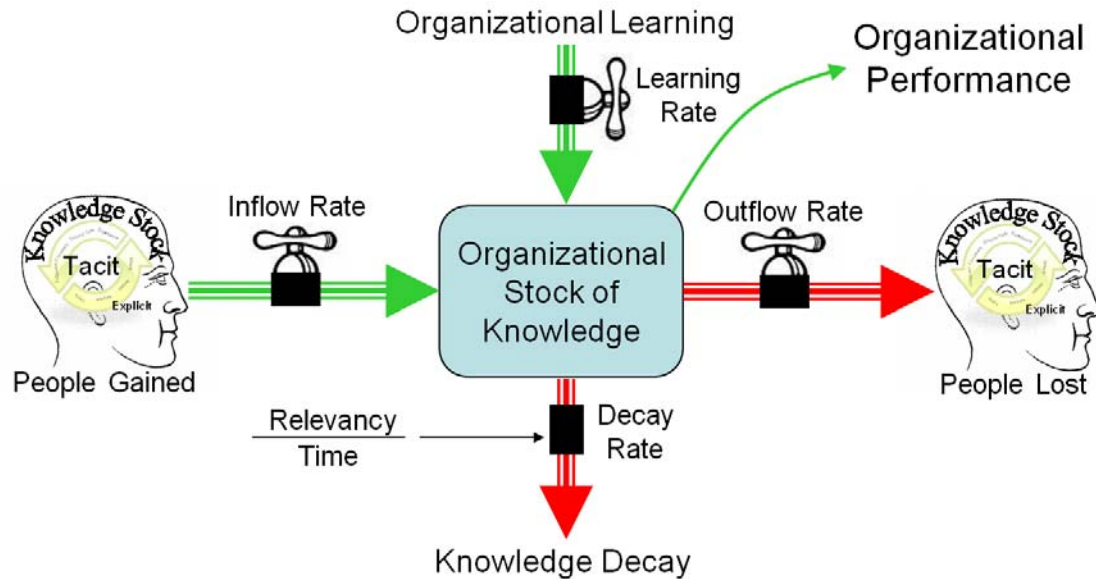
Organizational Learning
Learning Rate
Organizational Performance
Inflow Rate
Outflow Rate
Organizational Stock of Knowledge
People Gained
People Lost
Relevancy Time
Decay Rate
Knowledge Decay

Figure 3.   Stock and flows of organizational knowledge[11]

Although not every scholar agrees (e.g., Nissen, 2006), arguably, organizational knowledge is just a façade for the aggregation of all personal knowledge working in the organization. Grant (1996, p. 112) describes the organization as a "body of knowledge about the organization's circumstances, resources, causal mechanism, objectives, attitudes, policies, and so forth. All learning takes place inside individual human heads; and organization learns in only two ways: (a) by the learning of its members, or (b) by ingesting in members who have knowledge the organization didn't previously have." Therefore, an entire store of knowledge follows an employee who leaves the organization.

Indeed, a manager may think that "saving" knowledge in documents, virtual files or information systems is a remedy against losing knowledge. Applying a "knowledge focused" view of knowledge management, we point back to the concept that knowledge resides in the human mind and involves human cognition. Therefore, codified knowledge in the physical and virtual form is a snapshot of the knowledge in someone's mind and is better appreciated when recognized as information. (Miller, 2002) Although it is updateable, it's missing human cognition.   Therefore, these physical and virtual

[11] This is an aggregated stock and flow diagram. See Appendix A for the expanded view of this diagram. The box represents an accumulation of organizational knowledge. The level of the accumulation is adjusted by inflows and outflows. The valves control the flows. (Sterman, 2000).

representations cannot be considered knowledge per se. For instance, if knowledge existed in a book – let's say a textbook on calculus – then the book itself should be able to teach (share its knowledge) the student without any considerable effort or preparation by the student. However, as is always the case, the student must learn a progression of other prerequisite math topics that will serve as background knowledge for learning calculus. With relevant background knowledge, the student can then begin learning something new using the information presented in the calculus book. For a student without the relevant background knowledge, the calculus book is information having no meaning (i.e., data). The point here is that it takes relevant background knowledge to make use of information and data presented in documents and software. Hence, knowledge made explicit is not knowledge. It is more beneficial to recognize it as information in a "knowledge focused" knowledge management strategy. Consider the significant loss of "power" that occurs when knowledge emerges in its explicit state and then is captured as information outside the human mind. (Sveiby, 1997) Therefore, knowledge perishibility cannot be addressed by "saving" knowledge in a physical or virtual form since knowledge does not reside outside of the human mind.

Referring to Figure 3 again, knowledge also decays over time by losing relevancy.[12] It can decay due to inattention related to shifts in organizational focus or neglect. Knowledge decay represents knowledge that is no longer used or no longer needed. When it is detached from purpose it is short-lived. (Housel, 2001) Therefore, knowledge requires care and feeding. Knowledge is cared for by managing it. And, learning is the primary nutrient for maintaining a healthy and relevant stock of knowledge. It must be constantly updated using current events, evolution of functions, new issues and practice. (Wenger et al., 2002 p. 11) The relevancy of the knowledge is principally an organizational concern. Knowledge which is determined to be of little use to an organization is allowed to perish, unless an organizational member(s) maintains it due to self interest. Also consider that even if the relative level of knowledge stock is maintained in equilibrium (inflow equals outflow) and consistent (no new knowledge) it may fail to keep up with knowledge growth in the outside world. Referring now to

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[12] This is decay at the organizational level. At the individual level, the rate of decay is influenced by the relevancy of knowledge over time in addition to personal limitations (biological, environmental etc.).

Figure 4, this may result in a performance shortfall if the organization needs to perform at levels needed to improve or compete. Figure 4 illustrates that the learning rate must be adjusted if a gap – a performance shortfall – exists between actual performance and required performance. This is a subtle point, but many people and organizations work very hard to keep pace with expanding knowledge around them. For instance, the military constantly adjusts combat training to keep up with changes in the way adversaries wage war. Therefore, knowledge decays by losing relevancy over time and its relevancy changes to address performance requirements.
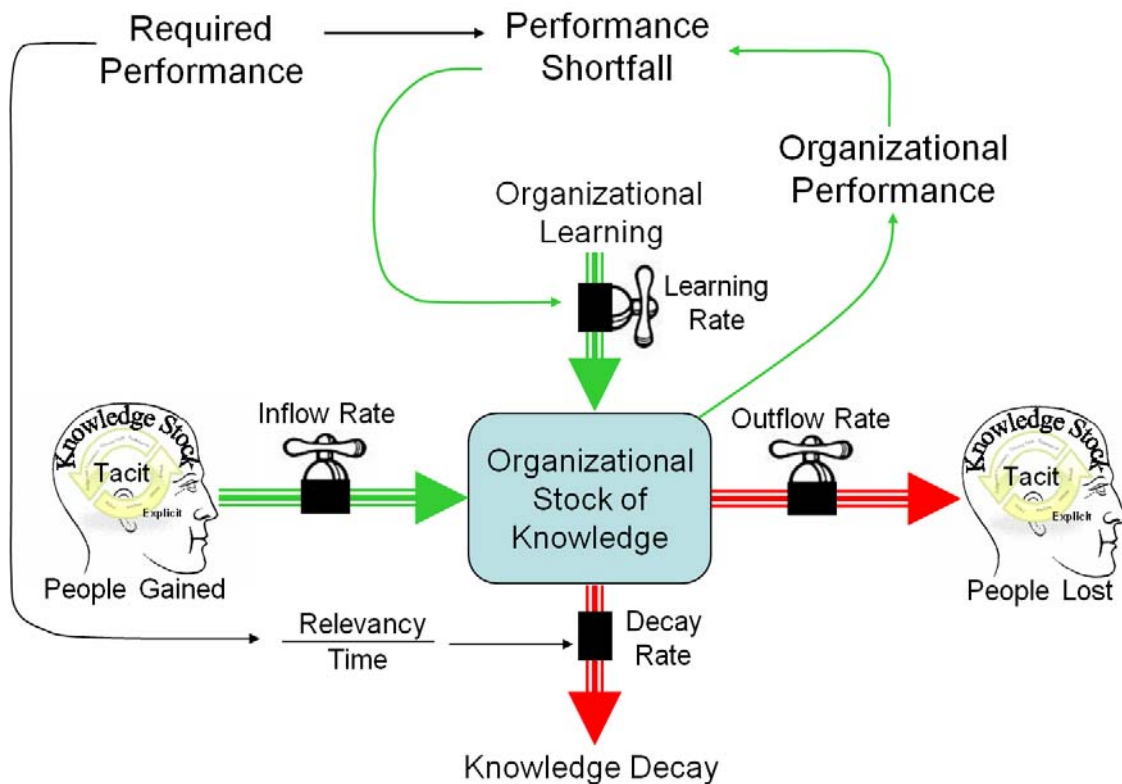

Figure 4.   Stock and flows of organizational knowledge: performance view[13]

As a final point on perishability, newly introduced knowledge is more volatile than current organizational knowledge. Its relevance is always uncertain until organizational members decide that it bears any usefulness for their work. If they deem it

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[13] This is an aggregated stock and flow diagram. See Appendix A for the expanded view of this diagram.

necessary, they incorporate it into their work processes. If it is not used it then decays at a higher rate than current (used) organizational knowledge. (Schulz, 2001, p. 664) To illustrate this, a second lieutenant (2Lt) who just graduated from college adds a diversity of unused (course work) and used (experience) knowledge to a gaining maintenance unit. If the unit finds the 2Lt's new knowledge on optimizing supply chains useful, they will use it, which slows down its rate of decay. If they do not use what he learned in financial accounting, then that specific knowledge will be allowed to decay at a much higher rate. The point with this discussion is that organizational knowledge, which is the aggregation of the knowledge of its members, is perishable through loss of people or the rate of its decay. Therefore, knowledge must be managed to mitigate the risks associated with knowledge perishability.

F.   KNOWLEDGE FLOWS

The final concept that needs to be understood, before addressing the issue of managing knowledge in the following chapter, is the abstract notion that knowledge flows. This final point builds upon the previous concepts about knowledge; knowledge resides in the human mind, it is tacit and explicit, it is actionable, and it is perishable. Remembering back to an earlier discussion on the uniqueness of knowledge, it is useful to build a metaphorical understanding of abstract concepts by making concrete something that is otherwise ethereal. In this case, knowledge does not physically flow, but having this metaphorical construction helps to elucidate a flow of cognitive "matter" from one place to another. What is important here is not that knowledge is fluid, but that knowledge has a purpose when it flows and that it can go where it needs to go. Just as blood must flow to nourish the body, so does knowledge have to flow to give life to action and enable organizational performance. Therefore, this section rounds out our understanding of knowledge by exploring how and why it must flow for it to be useful.

We begin by first understanding the origin of knowledge flows. Recalling the discussion in previous section (figures 3 and 4), we introduced the idea that knowledge can collect and flow. Drawing now from theory of stocks and flows (the study of complex systems), stocks represent accumulations that can be altered by "in-flows" and

"out-flows."[14]   Consider then the accumulation of knowledge in the human mind as a stock (stocks don't have to be tangible), as depicted in Figure 5, a simple stock and flow diagram.
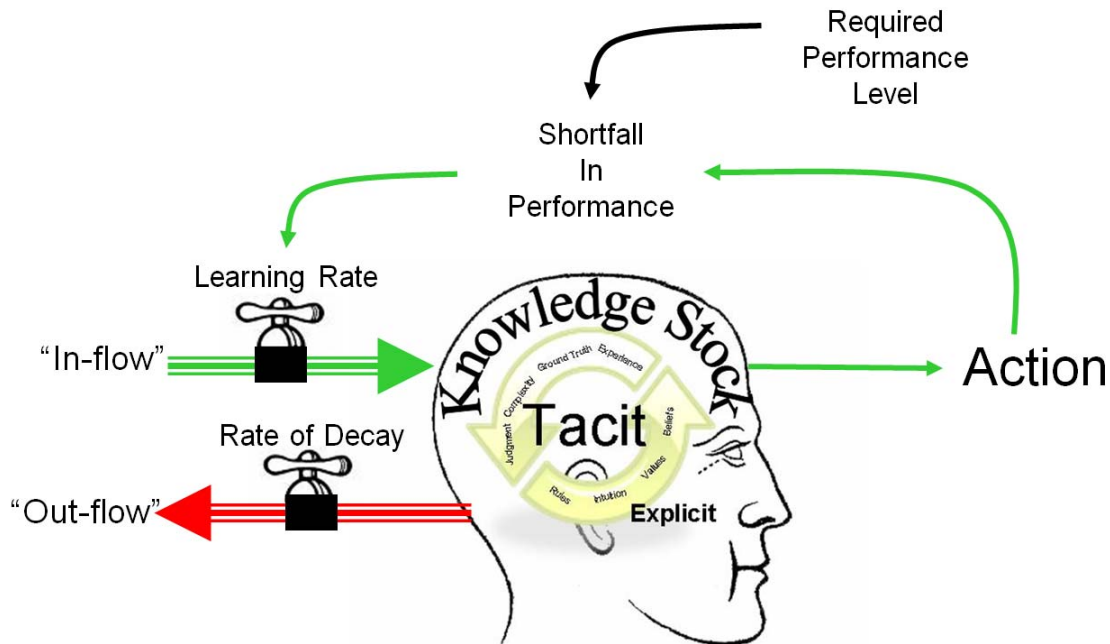

Figure 5.   Stock and flows of individual knowledge[15]

Stocks provide a system with memory which characterizes the state of the system because past accumulations persist. While accumulations persist over time, stocks also give a system inertia and continuity with behavior. (Sterman, 2000, p. 192) Hence, the accumulation of knowledge in the human mind provides continuity in behavior and gives it inertia. Knowledge then remains at rest – in a state of inertia – until otherwise compelled to change its state by forces impressed on it seeking to use its capacity for

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[14] "In-flows" and "out-flows" referenced here are considered "material flows" since they impact (increase or decrease) the level of the stock. On the other hand, "knowledge flows" only increase and do not decrease knowledge stock. Using stock and flow theory, "knowledge flows" discussed here refers to the path: "Inflow" → Stock → "Information flow." "Information flow" represents use of knowledge to take action, make a decision, or communicate. "Information flow" does not decrease stocks as "material flows" do. See Figure 4. For instance, the following path represents a "knowledge flow:" learning → knowledge stock → action →feedback → learning.

[15] This is an aggregated stock and flow diagram. See Appendix A for the expanded view of this diagram.

enabling work. This introduces an aspect of knowledge which is relevant for organizations. Knowledge at rest is of little use to an organization. Therefore, it must be put into motion for an enterprise to draw value from it.

Knowledge in motion, or knowledge flows, represents learning is taking place, communication is occurring, decisions are being made or work is being accomplished. According to Nissen (2006), "all knowledge required for an organization to perform its work processes and to accomplish its mission needs to flow within such organization." Therefore, another important point that can be drawn from this is that a person with a relevant stock of knowledge has the potential and the capacity to act. In other words, they have the potential to put knowledge into motion. Much like energy, when it is released, it can change the state of other objects. Zhuge (2006) refers to this as "knowledge energy," which is characterized by its power to drive knowledge flow. This also points to what Hayes-Roth (2006), Nissen (2006) and Zhuge (2006) refer to when they say "knowledge is power." For an individual, knowledge power is cultivated by managing the level and quality of one's knowledge stock, which means controlling its decay while continually learning. Doing so increases knowledge energy, which enhances the capability to induce knowledge to flow. Hence, knowledge flows originate from stocks of knowledge in a mind at work. Therefore, where knowledge is found to reside is from where knowledge can be made to flow, because knowledge flows originate from or terminate at a mind at work. Chapters three and four further discuss manners to promote knowledge flows.

Recall also that knowledge is principally tacit, but can emerge in an explicit state. We previously learned that tacit knowledge is deeply embedded and anchored in the individual. Intrinsically it is difficult to express. For instance, consider the difficulty in teaching someone how to ride a bicycle by only explaining how to do it. Can experience (e.g., what type of bike do you prefer to ride?) or technique (e.g., how to balance) be taught? Indeed, Polanyi (1966) makes sense in saying: "We know more than we can tell." Also consider that in some cases we don't want to tell, or we don't want to know. Polanyi (1958) believed that knowledge can only be willingly passed or received. This introduces the irony of dealing with tacit knowledge. Nissen (2006) summed it up this

way: "The sticky nature of tacit knowledge is thus a mixed blessing. On the one hand, it supports competitive advantage; on the other, it restricts knowledge flows within one's own organization."

Von Hippel (1994), and Leonard and Sensiper (1998) wrote about the reasons why knowledge is "sticky." Von Hippel, first of all, attributes this problem to the cost attached to acquire, transfer or use knowledge. When the cost is low, knowledge stickiness is low; when it is high, stickiness is high. Leonard and Sensiper add to this by also explaining that the nature of the knowledge in focus (quantity and complexity) and one's ability to share has a lot to do with it. When quantity and/or complexity increase, so does its stickiness. Also, one's experience, judgment, intuition and vocabulary enables or disables knowledge flows. Hence, the stickiness of tacit knowledge is a barrier to knowledge flow. Table 4 provides a summary of barriers related to the stickiness of knowledge. Each barrier represents a different organizational or individual concern that has implications on how knowledge flows. For example, the viscosity of knowledge is an individual concern because it represents the natural fluidity of knowledge in the human mind. This is not to say it does not impact the organization, but it is certainly more appropriate to address it at the individual level. Other barriers such as stinginess, inequality, equality, time, distance, newness and quantity have varying degrees of impact on the organization. Therefore, as knowledge and knowledge flows are the life blood for organizational action and performance, it is these barriers that must be managed to promote circulation.

Barrier	Description
Viscosity	**Organizational view:** This barrier is only at the individual level.
	Individual view: Knowledge is naturally sticky, but varies in degree of stickiness. The more tacit the knowledge the greater the viscosity of the natural flow tendency. The more explicit the knowledge the more fluid it is. It is easier to teach someone how to position themselves on a bike than how to actually ride it without falling.
Stinginess or Parsimony	**Organizational view:** If the cost (budget, time, and effort) of sharing knowledge outweighs the benefit the organization may decide not to share knowledge. People are also told not to share knowledge in order to protect an advantage (e.g., a trade secret), maintain control (e.g., to regulate response), perpetuate mistrust (e.g., potential misuse of knowledge), or due to a behavioral shortfall (e.g., a hoarding or conspiracy mentality).

Barrier	Description
	Individual view: A person self-sensors for the same reasons as organizations; cost, competition, control, mistrust and behavioral shortfalls. Unique to individuals is also the fear of failure or fear of drawing emotional disagreement (instead of intellectual disagreement).
Inequality	**Organizational view:** Typically not a problem at the aggregate organizational level.
	Individual view: Status between cooperations is a strong inhibitor to sharing. An apprentice is unlikely to share knowledge with his master due to uncertainty or intimidation. Consider also a boss-subordinate scenario. Also, position or role boundaries inhibit sharing. An experienced nurse with intuition about a situation is not expected to interject a patient treatment over that of a physician.
Equality	**Organizational view:** Typically not a problem at the aggregate organizational level.
	Individual view: Diversity of knowledge among a cooperation of peers is a strong inhibitor to sharing. As the diversity of peers increase in a cooperation the harder it is to express and value all relevant knowledge available to the effort.
Time or Distance	**Organizational view:** Distance (physical separation) and time renders sharing difficult. Technology offers a partial solution, but much knowledge is generated and transferred through body language or demonstration. (e.g., In-residence training and education is highly valued).
	Individual view: Same as the organizational view. Additionally, personal intimacy is sometimes needed to establish a comfortable communication path.
Newness	**Organizational view:** New knowledge is sticky because its usefulness is initially unknown. Its relevance can only be discovered by exposing it to existing knowledge. If new knowledge is deemed relevant to organizational work, then the organization will incorporate it into work processes. Sometimes the organization lacks knowledge to assess new knowledge.
	Individual view: Same as the organizational view. New knowledge is very costly for an individual to acquire. Sometimes it is more prudent to outsource knowledge (hire a plumber) than to try to acquire it through education or trial and error.
Quantity	**Organizational view:** Sometimes stickiness is high because the volume of knowledge required to solve a problem prohibits a full flow of knowledge. An organization wanting to create a new product-line may decide not too enter a new market if the volume of know-how required to enter is sizable.
	Individual view: Same as the organizational view.

Table 4.   Barriers to knowledge flows (After: Leonard et al., 1998; Schulz, 2001; and von Hippel, 1994)

As a final point, if knowledge flows then learning is taking place, which means that knowledge is being gained. All things considered, we should then most appreciate knowledge flows for the learning that it enables. There are several manners that learning occurs. Formally: education, training, research, contemplation, discussion, mentoring, observation, reading, trial and error, on-the-job training or work. Informally: storytelling, conversation, coaching, or apprenticeship. (Wenger et al., 2002) Nissen (2006) believes

that if these processes are not performed or performed well, then the associated knowledge does not flow or flow well. Recall that knowledge flows originate from or terminate at a mind at work. If the mind decides not to work, then learning – the knowledge flow – is restricted or stopped all together. Engaging wholeheartedly in the learning process creates the strongest knowledge current. Consider also that the knowledge a receiver receives during learning is not a copy of what the sharer shares. Recalling the components of knowledge (see Table 1), knowledge processing is dependent on such variables as experience, judgment or values. The learner must process what is received using those components that dominate at the time. For instance, a student certainly tries to learn what they believe will be on the final exam and bypass all other course material, if put under pressure. The point here is that knowledge is processed when engaging in those activities previously mentioned (education, OJT etc.). To explain this, we draw from the opening reference of this chapter:

> To the extent that organizational knowledge does not exist in the form needed for application or at the place and time required to enable work performance, then it must flow from how it exists and where it is located to how and where it is needed" (Nissen, 2006)

Knowledge moves with a purpose when it flows, and it additionally undergoes a transformation from its point of origin to its destination. As it is processed, it cycles through activities that have implications on how and where it flows. These activities make use of both knowledge and information and are addressed in Chapter III. The point here is that organizations must engage in managing activities associated with knowledge flows to draw benefit from the power of knowledge. By appreciating the implications of the knowledge characteristics presented in this chapter (knowledge resides in the human mind, it is tacit and explicit, it is actionable, it is perishable, and must flow to be useful), the organization is better prepared for developing a knowledge management program. The following chapter uses what has been learned here to explore next the issue of knowledge management.

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III. KNOWLEDGE MANAGEMENT

When knowledge is leveraged effectively it leads to superior performance by preserving efficacious pursuits, deprecating ineffective practice and promoting innovation. This third chapter explores this thought and complements the previous chapter by now turning to answer the question: "Why and how should knowledge be managed?" The chapter begins by first surveying the prevailing thoughts about what "Knowledge Management" (KM) is and then it addresses the unsettled controversy whether knowledge can or cannot be managed. The chapter then turns to understanding what KM is about by exploring methods for leveraging knowledge, harnessing knowledge flows and by introducing a framework useful for developing a program. The chapter closes with a look at how KM has emerged in the Department of Defense and the Air Force to assess if the military environment supports or hinders the growth of effective "Knowledge Management" practice.

A. WHAT IS KNOWLEDGE MANAGEMENT?

Managing knowledge is not new. Figallo and Rhine (2002) describe how cave paintings depicting wildlife sightings in France, dating back to 33,000 B.C., are believed to be the earliest recorded attempts to "share" experiences between people. They further chronicle how the Egyptians, in the third century B.C., built the Library of Alexandria "to serve as a center for knowledge exchange and debate among scholars and scientists from all over the known world." Consider also those notable historical figures mentioned in the beginning of Chapter II – Plato, King Solomon and Albert Einstein. One of them, Plato (in the same fashion as Socrates and Aristotle), absent mass media, used conversation as a basis for learning, enabling knowledge flow. (Chappel, 2005) Lave and Wenger (1991) describe how master-apprentice relationships emerged in ancient China and Europe as an effective form for promoting the flow of knowledge – from master to apprentice. Guilds were also used by professions (blacksmiths, masons etc.) to "protect" the development and sharing of knowledge within the guild. (Wikipedia, 2007b) Indeed knowledge has always been "managed" in one way or another. However, with the

emergence of the Information Age[16] "Knowledge Management (KM)" turned toward a more concentrated focus on capturing and sharing data and information.

The Information Age certainly was a turning point for how knowledge was perceived and dealt with. A prevailing trend emerged. More so in the United States than in other countries, knowledge began to be appraised as a tangible object that could be structured and codified (e.g., databases, patents and documents). (Hildreth and Kimbel, 2002; Svieby, 2001b) In the military, this focus on information combined with the emergence of Business Process Reengineering and Outsourcing and Privatization[17] in the 1990s amplified a common organizational challenge: perishibility of knowledge (see Chapter II, Section E). Sveiby (2001b) explains how the private sector went through a similar cycle in the 1980s that gave birth to the emergence of the modern "KM movement." He points out the importance of understanding that "KM has not evolved out of a set of formal methodologies. As a concept it has at least three origins and this makes the field confusing for people trying to grasp it for the first time;" an American Information Management/Artificial Intelligence origin, a Japanese knowledge Creation/Innovation origin and a Swedish KM Strategy/Measuring origin. (Sveiby, 2001b; Takeuchi, 1998) The point here is that the "management" of knowledge is not new, is not a business fad and has roots that can be traced back across history. Indeed, throughout history, many have sought to nurture and leverage what they and others know, and to protect what unknowingly was a resource needed to accomplish work and improve performance. Today that continues, but in a more deliberate and varied fashion.

Presently, as diverse a field is "Knowledge Management", so is the contrast of "color, tone and emotion" in the understanding of what KM is – as an activity or a program. Across a spectrum of research, implementations and definitions available on KM, one can gain a sense of the potential for contrasting views and purpose. For

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[16] The Information Age is primarily characterized by the phenomenon that gradually preceded the Industrial Age and can be described as when information ceased to be scarce and became a key resource in society and business. Figallo and Rhine (2002) point to when we began to harness a technology that moved at the speed of light after World War II as evidence of its emergence. Friman and Bordetsky (2006) point to globalization and digitalization. Kelley (1999) believes the advent of a "network economy" as evidence.

[17] BPR and Outsourcing in the military is principally concerned with achieving budget and human resource savings and is largely characterized by reductions in force, divestiture of capability and loss of experience.

instance, in a 2006 study, Ekbia and Hara found that 5,125 "scholarly" articles were written on the subject in 2005. They observed that many of these promoted KM as a strong managerial tool, but also found "interesting differences" in the perspectives adapted. In another study, Rigby (2007), using a survey of management tools and trends, 1,221 responses from a broad range of business executives were received. He found that 69% of respondents used knowledge management in their organizations (it ranked 10th for usage out of 25 tools). Also, in the military, each Service is now promoting KM as a strategic imperative. For instance, the Air Force included implementation of KM as a major strategic goal. (AF-CIO, 2004) The Army and Navy have also implemented KM, but with differing approaches. (Chan, 2002; Army 2007)

In evaluating the KM field Sveiby (2001a and 2007) noticed that there are basically two streams of thought: a knowledge focus and an information focus. Table five summarizes these divergent streams of thought. He explains that KM-users with a knowledge-focused perspective believe that the value in knowledge comes out when its many forms are leveraged. The KM-users with an information-focus believe the value in knowledge comes out when it is codified into information.

Stream	Goal	Origin	Description
Knowledge-Focused	Seeks Effectiveness	Japanese/ Swedish	The value in knowledge comes out when its many forms are leveraged. The focus is on people, learning and managing competencies individually. A knowledge-focused KM strategy tends to invest in people, training, trust, management education and to make the work environment more attractive and conducive for communication. The expected outcome is creativity, innovation and knowledge creation.
Information-Focused	Seeks Efficiencies	American	The value in knowledge comes out when it is codified in the form of information. The focus is on information management systems. Knowledge is seen as an object that can be identified and handled in information systems. An information-focused strategy tends to invest in computer systems, databases search engines, document handling, etc. The expected outcome is accessibility to information, avoiding duplication of effort, and timeliness.

Table 5.   Streams of thought on Knowledge Management (After: Sveiby, 2001a and 2007)

Truly, across the board, there is a diverse understanding of what KM is. As is done in Chapter II, this thesis is not intended to provide a definitive account. Rather, it offers a sampling of thoughts on KM to coalesce a working and pragmatic understanding of KM fitting for following this research. By doing so, this chapter, complemented by Chapter II on Knowledge, serves as the launching point to explore communities of practice as a KM approach. Therefore, it is worth exploring some thoughts toward proposing a working definition for sharing meaning of what "Knowledge Management" is.

Suresh (2002) describes "Knowledge Management" as a:

processes that helps organizations find, select, organize, disseminate, and transfer important information and expertise necessary for activities such as problem solving, dynamic learning, strategic planning and decision making…What do we know, who knows it, what do we not know that we should know?...Knowledge management is concerned with the exploitation and development of the knowledge assets of an organization with a view to furthering the organization's objectives."

Nissen (2006) describes it as the "practice of leveraging knowledge for competitive advantage." He believes that it can be leveraged by harnessing how it flows. So critical is this that he adds that knowledge flows "are necessary just to accomplish the work at hand."

Lehaney, Clarke, Coakes and Jack (2004) wrote:

Knowledge management refers to the systematic organization, planning, scheduling, monitoring, and deployment of people, processes, technology, and environment,…to facilitate explicitly and specifically the creation, retention, sharing, identification, acquisition, utilization, and measurement of information and new ideas, in order to achieve strategic aims, such as improved competitiveness or improved performance…

The Army (2007) adapted the following description: KM is

The art of creating, applying, organizing, and transferring knowledge to facilitate situational understanding and decision making. KM supports improving organizational learning, innovation, and performance. Effective KM provides…knowledge products and services that are relevant, accurate, timely, and useable.

The Air Force (AF-CIO, 2004) used this description in a strategic document:

Knowledge management is a systemic process of identifying, capturing and transferring information that can be used to enhance performance or improve related tasks or processes…The focus is to facilitate sharing of enterprise intellectual capital…and put an enterprise focus on knowledge creation and sharing.

This is a useful sampling of some prevailing thought on KM, but it does not reflect all thought on the matter. There are many academics (e.g., Karl Sveiby, Ikujiro Nonaka, Peter Drucker, T.D. Wilson) who are careful not to "define" KM. This author found that many of them held this reservation, at varying degrees, due to the belief that knowledge cannot be managed as you would traditional resources. Therefore the idea of discussing "managing" knowledge is out of place for them.

Wilson (2002) argues:

…data and information may be managed, and information resources may be managed but knowledge (i.e., what we know) can never be managed, except by the individual knower and, even then, only imperfectly. The fact is that we often do not know what we know: that we know something may only emerge when we need to employ the knowledge to accomplish something.

Allee (1997) shares a similar view saying:

There is no way I could possibly catalog even my own personal knowledge. What makes me think we can somehow catalog or map all the knowledge that resides in a complex enterprise of hundreds or thousands of people? What on earth do we think we can accomplish by 'managing' knowledge?

Many also believe that most KM programs are nothing more than information management programs. (e.g., Hildreth and Kimbel, 2002; Miller, 2002; Wilson, 2002) The belief is that authors and practitioners are using "knowledge" simply as a synonym for "information." Wilson (2002) points out:

The review of journal papers, the review of consultancy web sites and those of the business schools, suggest that, in many cases, 'knowledge management' is being used simply as a synonym for 'information management'…'search and replace marketing'.

Most of those who hold a cautious view about "Knowledge Management" do offer useful insight on the matter, albeit not calling it KM. For example, Nonaka (1991)

"operationalizes" his thoughts on knowledge by suggesting that organizations should be focused on exploiting activities that create knowledge. "These activities define the 'knowledge-creating' company, whose sole business is continuous innovation." Karl Sveiby (2001a) dislikes the prevailing use of the term "Knowledge Management," but uses it reluctantly due to how it has permeated across the private sector as a notable business tool. Explaining his thought on KM: "A better guidance for our thinking is therefore phrases such as 'to be knowledge focused' or to 'see' the world from a 'knowledge perspective'. To me knowledge Management is: The Art of Creating Value from intangible Assets." Kotzer (2001) reported that Peter Drucker, when asked about KM, "…scoffs at the notion of knowledge management…Drucker says it's really about what individual workers do with the knowledge they have." The point here is that although there is disagreement about what KM is, there is agreement that the organization needs to be active in dealing with knowledge. Many also add that information has a place in the equation.

"Knowledge Management," however viewed or titled, is about doing something with knowledge and information. Up to now the focus has been on knowledge due to the prevailing lack of understanding of what it is, but the importance of the role of information cannot be ignored. Recall from Chapter II, Section B, on the uniqueness of knowledge, knowledge enables performance, and data and information provide a supporting role. Therefore, in an organization, each element is important and contributes differently toward performance.

Drawing from the variety of thought just discussed and the fundamental concepts about knowledge from Chapter II (its unique from data and information, resides in the human mind, is tacit and explicit, is perishable, and must flow to be useful), the following working definition is developed to be used for this thesis:

> Knowledge management is the practice of leveraging an organization's capacity to act (know-how/when/who/where) for creating value (work, decision-making, controlling and predicting events, and innovation) for the organization.

> The primary aim is to influence organizational elements (people, work processes, structure and technology) toward increasing and preserving relevant knowledge by harnessing knowledge flows (learning).

A supplementary aim is to manage information resources (information, data and IT) toward supporting knowledge flows by exploiting information flows.

Effective knowledge management should lead to superior performance by preserving efficacious pursuits, deprecating ineffective practice and promoting innovation.

This working definition is heavily influenced by the knowledge-focused stream of thought. It also recognizes the importance of the information-focused view since it provides for elements that critically support cultivating knowledge in the organization. The remainder of this chapter uses this as the platform to explore this topic by developing further three key concepts infused in this working definition and that are useful for constructing a knowledge management program and subsequently, a community of practice.

1. knowledge management is about leveraging knowledge
2. knowledge management is about harnessing knowledge flows
3. knowledge management is about bringing together personnel, work process, structure and technology

B. KNOWLEDGE MANAGEMENT IS ABOUT LEVERAGING KNOWLEDGE

"Knowledge Management" is about leveraging an organizational resource that is in the human mind. To the list of traditional organizational resources – land, labor, capital and information technology – knowledge is not a new addition. Due to its intangible nature, it's been largely in "stealth" mode in most organizations. It's not possible to observe, but its presence is confirmed by the action it enables. (Housel and Bell, 2001) Well before KM emerged as an alternative business tool in the 1980s (Svieby, 2001b) organizations were already quite proficient at "managing" knowledge. Consider the apprenticeship and mentorship programs, recruiting, hiring and assignment activities, recognition programs, organizational structuring, process engineering, and training and education that have always had a place in a firm's operations and considered traditionally part of the human resource function. Certainly, effective Human Resource Management (HRM) is essential for optimizing organizational performance. Even more, Newell, Robertson, Scarbrough and Swan (2002) believe that linking KM with HRM has

important implications for organizational performance. Hislop (2005) argues that Human Resource Management (HRM) practice falls squarely underneath the KM umbrella. Brand (1998) believes the role of KM is "to leverage the experience in the heads of employees so that downsizing, or staff turnover cannot damage the competitive edge and innovation ability of the company." The point here is that leveraging knowledge begins and ends with how we gain, care for and lose people. (Sveiby, 2001b; and Newell, Robertson, Scarbrough and Swan, 2002)

Consider then that KM may be much more a HRM issue than an IT issue. (Nissen, 2007) Unfortunately, most KM programs are borne in a company's IT department. For example, the Army, Navy, and Air Force have all strategically assigned KM to their respective information technology functions and Chief Information Officers – Army G6(CIO), Navy N6(SECNAV-CIO) and Air Force A6(XC). (Army, 2005; Navy-CIO, 2001; and AF-CIO, 2004) Ironically, the military is arguably the best in the world in dealing with human resource issues and nurturing knowledge in people – from basic training through life cycle career management. One could say that KM is partially in "stealth-mode" in the Service's human resources programs. It is being done – leveraging knowledge – but not as part of an enterprise-wide strategic KM purpose. This author did not find any evidence that would suggest KM in the military is at least a strategic joint venture between HRM, IT and other relevant functions. It seems to be an exclusive CIO responsibility. Nonaka (1999) suggests KM – "knowledge-creating company" in his words – should be an approach "that puts knowledge creation exactly where it belongs: at the very center of a company's human resources strategy." Therefore, the organization should consider human resource activities as an important piece of the KM equation. Leveraging knowledge starts with managing the human resource.

"Knowledge Management" is also about leveraging the organizational environment. Chapter II introduced the complex nature of knowledge in the human mind. This referred to the circumstances or conditions by which knowledge emerges, is nourished and is used. Similarly, functioning in the workplace, people are more likely to thrive in fertile ground that promotes performance than in an environment that hampers performance. The workplace (actual or virtual) truly is a complex environment. Figallo and Rhine (2002) refer to this as the "organizational culture" where certain conditions

and nutrients are required to leverage knowledge. Drawing from a metaphorical view, they ask: "If a knowledge-sharing community is like an orchid, how do we create the right temperature, humidity, and soil conditions for its healthy growth and spectacular bloom?" Nonaka (1991) points to the success of Japanese companies in their "ability to respond quickly to customers, create new markets, rapidly develop new products, and dominate emergent technologies." At the heart of Nonaka's "Knowledge-Creating" company is an organizational culture deliberately designed for innovation. 3M has had similar success. Arguably, they are the most innovative company in the world – third in BusinessWeek's list of most innovative companies. (Arndt, 2006) 3M sees KM more a cultural and organizational issue than a technological one. They credit this focus as the ground where KM has flourished to support their innovation. (Brand, 1998) Summing-it-up, any effort to enhance flows of knowledge must concentrate necessarily on the organization's culture, structure, processes and technologies – the environment. (Nissen, 2005) The lesson here is that the organizational environment is significant for leveraging knowledge.

Organizations should look to establishing an environment conducive to effective "Knowledge Management." Several authors provide suggestions. Davenport, De Long, and Beers (1998) believe having a "knowledge-friendly" culture to be key in KM success. Brand (1998), writing about 3M, says that an atmosphere of generosity, freedom, safety and trust is where innovation can flourish. For Nonaka (1991), the centerpiece of the Japanese approach is the recognition that creating new knowledge is a matter of tapping into the tacit knowledge of individual employees. This promotes an environment where everyone makes a difference. Newell, Robertson, Scarbrough and Swan (2002) write about the importance of "structural capital" (e.g., physical assets, ergonomics and physical layouts) as important considerations for KM. Wenger (1998) adds that the designing and organizing for learning is also an important environmental factor. The organizational environment is indeed very complex. Presented here is just a sampling of some environmental issues that noted KM researches have dealt with. The full list is perhaps endless. Table six provides a summary of those issues highlighted

here. The point here is that the organization should address environmental issues toward better leveraging knowledge. An organization's ability to leverage knowledge can be hampered or helped by its environment.

Issue	Description
"Knowledge-Friendly" culture	People have a positive orientation to knowledge and executives encourage their knowledge creation and use. People are not inhibited in sharing knowledge. The KM program fits the existing culture. (Davenport, De Long and Beers, 1998)
Everyone matters	Managers recognize the serendipitous quality of innovation; therefore it is not simply a matter of processing information. Innovation depends on tapping into the insights, intuitions, and hunches of individual employees and making it available to all. (Nonaka, 1991)
Structural capital is important	The physical assets that affect the organization's capability to effectively create and leverage knowledge: equipment, ergonomics, desk space, office layout, and technology to name a few. (Newell, Robertson, Scarbrough and Swan, 2002)
Atmosphere of generosity, freedom, safety and trust.	"Effective Knowledge Management is essential to innovation and it too needs an atmosphere of generosity, freedom and safety if it is to act as the river on which innovation can sail." (Brand, 1998) "…studies suggest that trust and collaboration are essential ingredients for the willingness to share knowledge, information and ideas." (Sveiby, 2003)
Design and organize for learning	The systematic and planned design of social (e.g., social networks, meetings or apprenticeship program) and organizational processes (formal/informal structures, routines, or rules) for learning. Learning transforms who we are and what we can do. (Wenger, 1998)

Table 6.   Leveraging knowledge: Examples of environmental issues

"Knowledge Management" is also about promoting learning and knowing to leverage knowledge. Chapter II, Section F, introduced the concept of flows of knowledge, which is also characterized as learning. Knowledge flows, or knowledge in motion, represents learning is taking place, communication is occurring, decisions are being made or work is being accomplished. (Nissen, 2006) Therefore, knowledge has a

greater purpose when it is in motion because at rest it is of little use to an organization. Learning can lead to increased performance. (Nissen 2006) This is a central theme in a knowledge-focused approach to KM.

Wenger (1998) suggests that we need to adapt a new perspective about learning in order to leverage knowledge in the organization. He believes it a fundamental social phenomenon that is as much part of our human nature as eating or sleeping. As such, he posits learning as social participation characterized by several components, summarized in Figure 6. These components are deeply interconnected and "mutually defining" – they can change places with "learning." *Meaning* is learning about ability to experience life and the world as meaningful. *Practice* is learning about those things that can sustain mutual engagement in action. *Community* is learning about the social configurations in which our efforts are seen as worth pursuing and our participation is recognizable as competence. *Identity* is a about how learning changes who we are and creates personal histories in the context of our organization or community. For individuals, learning is an issue of engaging in and contributing to the practice of their organization or community. For a community, learning is an issue of refining practice and nurturing new members. For an organization, learning is an issue of sustaining what it does well, stopping what it doesn't need to do anymore and improving through innovation. (Wenger, 1998; and Nonaka, 1991) Therefore, an adjustment in thought that is suggested here is to consider that learning is not exclusively an "academic" activity. Rather, it is also relevant to "our daily actions, our policies, and the technical, organizational, and educational systems we design." (Wenger, 1998)
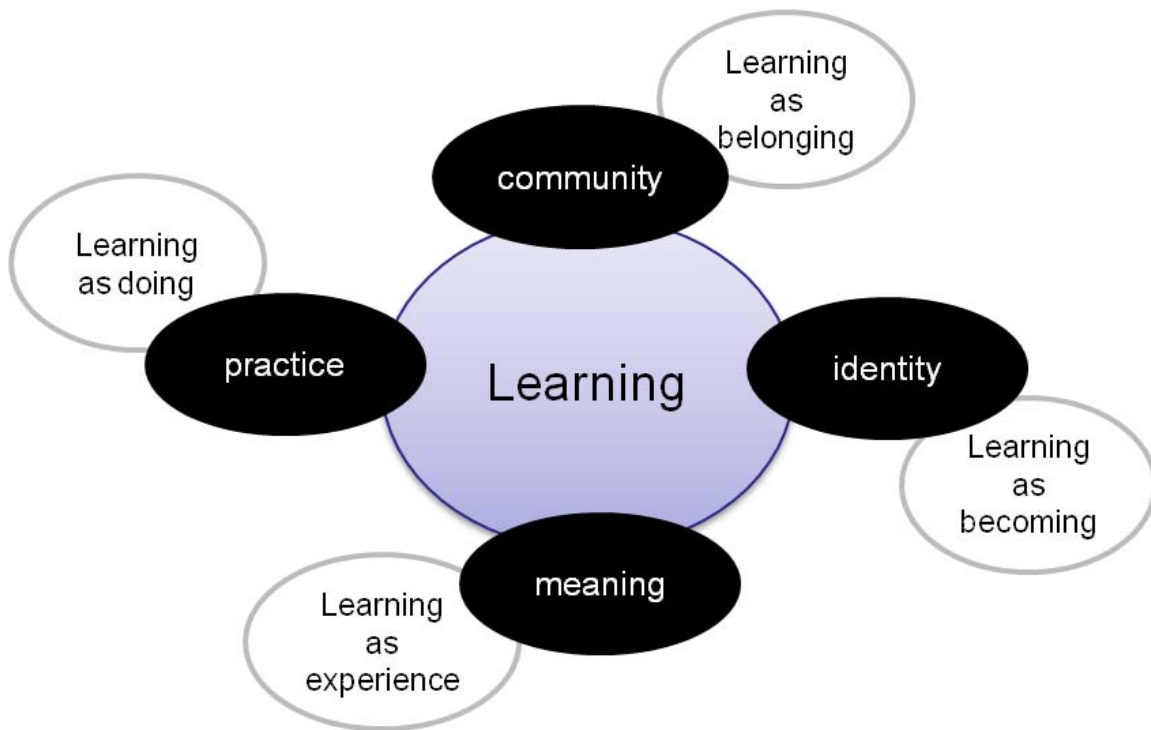
Figure 6. Components of a social theory of learning (After: Wenger, 1998)

Learning happens, but it is much better to steer it in the direction of organizational needs. Although designing learning is an impossible matter, Wenger (1998) believes you can design for it – that is, facilitate it or frustrate it. Drawing from our working definition on KM, harnessing knowledge flows is the principle aim for the knowledge-focused view of KM. Therefore, it is beneficial for the organization to pay attention to the state of learning. However, it is worth mentioning here that paying too close attention to learning is not always beneficial. Nissen (2006) refers to it as the "learning-doing tension." March (1991) calls it the "exploration/exploitation trade-off." For managers, this is a common dilemma. How much time and resources should be allocated to learning (exploration) when doing (exploitation) is how money is made, projects are completed or missions are accomplished? Indeed, both are essential for organizations, but they clearly also compete for resources and the manager's attention. March (1991) suggests that one should consider the short-run and long-run gains. Exploitation has greater implications on the short-run, while exploration has greater implications on the long-run. Therefore, maintaining an appropriate balance between the two is important. In the military, there is much to be gained by managing this balance since personnel retention is a key issue for

long term force development, sustainment, and continuity. As previously stated, learning is not necessarily an academic effort; rather it is profoundly part and parcel to daily activity. Therefore, exploration is something that can be designed for and married with exploitation.

Leveraging knowledge is much more a focus than a process. The purpose of this section is to present a few key issues that require attention for a KM program to succeed. By no means are the points made here exhaustive, but they highlight those issues that this author found to be beneficial for communities of practice as a KM program. In summary, with a knowledge-focused approach to KM:

- KM is about leveraging knowledge
- Leveraging knowledge starts with managing the human resource
- An organization's ability to leverage knowledge can be hampered or helped by its environment
- Organizations should balance learning with doing (work)

C. KNOWLEDGE MANAGEMENT IS ABOUT HARNESSING KNOWLEDGE FLOWS

Recall from the previous section that a central point in the knowledge-based view of "Knowledge Management" is that knowledge flows must be harnessed. These "flows" of knowledge represent learning. They also represent a cycle of activities that have implications on how and where it flows. This section will address this by exploring the practical aspects of knowledge flows by discussing how to promote flows, how to address barriers and then decompose those activities that an organization should ultimately be seeking to manage toward harnessing knowledge flows.

We should most appreciate knowledge flows for the learning they enable. Drawing again from Wenger (1998), you cannot design learning, but you can certainly design for it. Also recall that learning – knowledge flows – is something that just happens since it is profoundly a part of daily activities. Thirdly, from Chapter II, knowledge is "sticky" and tends to clump acting as a barrier to knowledge flow (this point will be addressed next). Therefore, this author posits that for knowledge to flow with purpose, relevant to the organization, managerial intervention is needed.

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There is an abundance of methods that can be used to harness the flow of knowledge. Swap, Leonard, Shields and Abrams (2001) categorize these methods as either *internalization* or *socialization*. Both specifically lead to learning. They explain that *internalization* refers to the process of embodying information or explicit knowledge into tacit knowledge and is closely related to "learning by doing." *Socialization* refers to the process of sharing experiences and thereby creating tacit knowledge such as "shared mental models and technical skills." In both cases knowledge is moving from when and where it is located to when and where it needs to go. Nonaka (1991) adds to this "learning taxonomy" suggesting that two other categories exist; *articulation* and *combination*. Both specifically support learning. He explains that *articulation* refers to the process of converting what you know into an explicit form to be communicated to the extent of creating new information. *Combination* refers to the process of putting together disparate pieces of information to form new information. Combined, these four categories, summarized in Figure 7, provide a manner to generalize and better understand methods of learning, which will be discussed next.
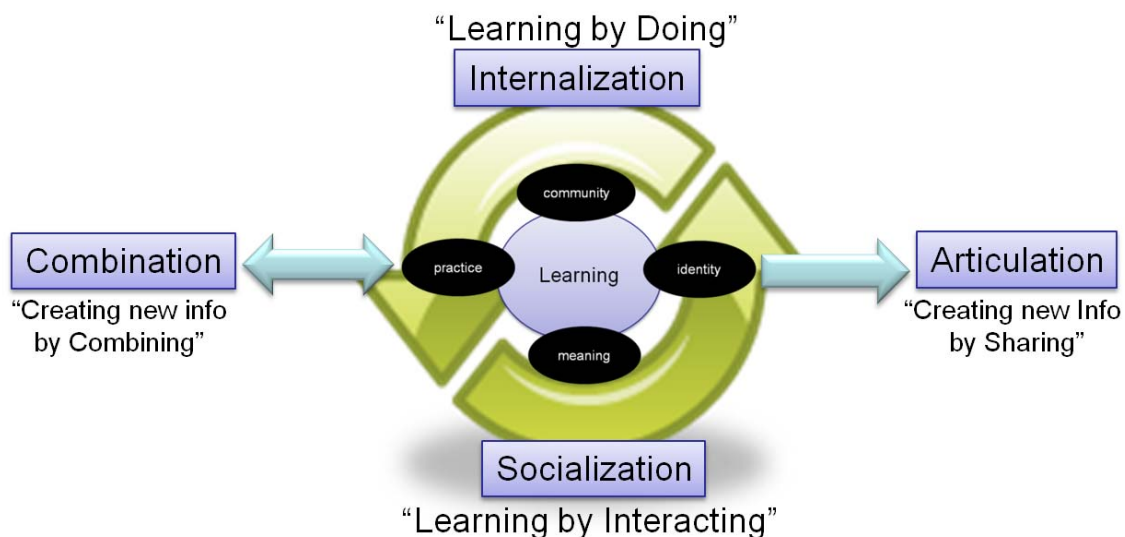
Figure 7.   Methods of Learning (After: Nonaka, 1991; and Nissen, 2006)

This author found that this learning taxonomy is used by many. In addition to Nonaka (1991) and Nissen (2006), Wenger, McDermott and Snyder (2002), and Swap, Leonard, Shields and Abrams (2001) use it extensively to describe tools that are considered effective for learning. They include:

- Education
- Training
- Research
- Consideration
- Discussion
- Mentoring
- Observation
- Reading
- Trial and error
- Reflection
- On-the-job training
- Work
- Storytelling
- Conversation
- Coaching
- Apprenticeship

Figure 8 places these tools in a continuum characterized by the learning methods previously discussed. The author used the writings, referenced in this section, and personal experience to best place each tool in relation to the learning methods.[18] As such, this figure represents value judgments made by this author. Therefore, this figure is primarily offered to stimulate this discussion further. Consider then, in general, that each tool contributes differently toward learning. For instance, *Reflection* is the action of deeply processing information through ones experience, judgment, values etc. (see Table 2) with the specific intent to learn something new. For this reason, it is placed near the "heart" of this continuum. The purpose of *reflection* is profoundly a learning activity. *Mentoring*, on the other hand, is the activity of drawing from someone's deep knowledge

[18] The author was unable to find any previous research on this, which presents an issue that would require further study and is beyond the scope of this thesis.

with the intent to be taught or guided. (Swap, Leonard, Shields and Abrams, 2001) For this reason, it is placed on the "Learning by interacting" sector of the continuum. Interaction is required. Through conversation or discussion, information is articulated. Notice also that *Mentoring* straddles *Learning* and *Peripheral Learning*. The latter represents what Lave and Wenger (1991) describe as situated learning that occurs through the engagement in activities that entail learning. In summary, these tools represent an inventory of opportunities that a manager should consider using when trying to harness knowledge flows. They also represent viable considerations for addressing the "learning-doing tensions" in the organization, because many of them involve engagement in doing and allow for peripheral learning.
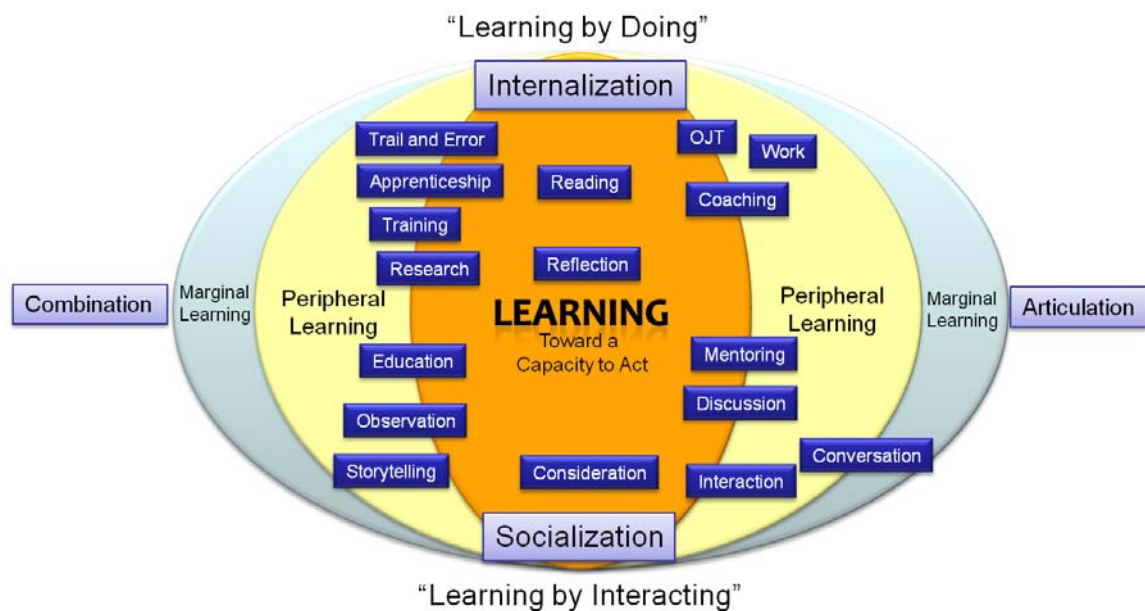
Figure 8.   Spectrum of tools for learning

Recall from Chapter II that knowledge is "sticky" and tends to clump, acting as a barrier to the free flow of knowledge. This phenomenon is extremely problematic and is a significant issue in "Knowledge Management" programs. Therefore it is important to discuss this issue relative to the harnessing of knowledge flows. Bartczak (2002), in "Indentifying Barriers to Knowledge Management in the U.S. Military," studied various environmental factors impacting KM growth in five military organizations. She discovered that a "new urgency for the development of learning organizations is closely associated with the fact that organizations were struggling with ways of learning in the

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face of a rapidly changing environment." Although, not addressed by Bartczak, it is likely that one reason military organizations struggle with learning, is due to the sticky nature of knowledge. Few offer concrete solutions regard this. Nissen (2006) suggests that the clumping must be identified. Nonaka (1991) refers us back to the need to understand the nature of knowledge. Once this is achieved, he then suggests that everyone's knowledge must be tapped into by making it available to others. Fahey and Prusak (1998) suggest that organizations must avoid the "competency trap" – doing the wrong thing well – by permitting employees to experiment (exploration). Drawing again from Nissen (2006), he also believes it is a matter of will:

> For knowledge to flow at the individual level, the expert (or simply more knowledgeable person) must be willing and able to share; the novice must be willing and able to learn; and the organization must be willing and able to help them do so.

Individuals and organizations must be willing to share and learn. In 3M, when this did not occur, Brand (1998) believed it was due to a deficiency in the organizational culture and trust. This was addressed by creating an atmosphere of "generosity, freedom, and safety." The point here is that knowledge flows do not naturally flow freely. Therefore, drawing from a previous discussion summarized in Table six, organizations may find help by seeking approaches that leverage knowledge by addressing environmental issues. Indeed, knowledge and flows of knowledge present a major managerial challenge. However, a knowledge-focused approach to KM represents a beneficial manner for addressing these issues.

The point here is that managers must be aware that "Knowledge Management" is also about harnessing how knowledge flows in the organization. In the knowledge-focused view of KM, this requires that learning be part of the organizational strategy. The right balance must also be sought between exploration and exploitation. A wide variety of learning tools provide the manager opportunities to address this learning-doing tension. Further, the manager must be aware of knowledge flow barriers to properly identify them when they present themselves to implement situation dependent solutions. Addressing environmental issues is one useful method for leveraging knowledge flows. In summary:

- KM is about harnessing knowledge flows – learning

- Learning occurs through internalization or socialization and is supported by articulation and combination

- Learning tools should be a part of the organization's KM program

- When knowledge is sticky, evaluate the organizational environment

D.   KNOWLEDGE MANAGEMENT IS ABOUT BRINGING TOGETHER PERSONNEL, WORK PROCESS, STRUCTURE AND TECHNOLOGY

Methods and degrees of "Knowledge Management" implementations vary in design. This section describes a suggested framework that emerged in this research as the prevailing approach throughout the academic literature reviewed. Rollet (2003), Nissen (2006), Sveiby (2001b) and Suresh (2002) agree that the knowledge should be managed by bringing together the organizational elements: personnel, work processes, structure and technology. Nissen (2006) explains that these four elements operate as a cohesive system and should be addressed as an integrated problem because they "are tightly interconnected and interact closely."

People. In any knowledge management program, people represent the central element of the system. Hildreth and Kimble (2002) believe that it is important to recognize that KM projects must address people first. If this does not occur, they further state that "the project is not Knowledge Management at all." Nonaka (1991) agrees, stating "knowledge always begins with the individual…making personal knowledge available to others is the central activity of the knowledge-creating company." Therefore, a knowledge-focused design is primarily concerned with the flow of knowledge between people. Since knowledge is resident in people by way of experiences, intuition, training, education, values and social interactions they are the first consideration in this KM framework.

Roles are a very important and often forgotten aspect of the *people* dimension in KM. Every person in the organization has a role. Neglecting or abusing these roles could negatively impact the KM program. Davenport and Prusak (1998) believe that if KM is to thrive, roles and responsibilities need to be understood and fulfilled. These roles vary and have implications at the strategic and tactical levels of the organization. It is unrealistic, they say, to just simply throw KM activities on top of existing positions.

Some dedicated positions are required, but it is certain that all people at all levels must participate in the KM program. They also point out that KM will not succeed in an organization if it is "solely the responsibility of a small – or even a large – staff group." Ultimately, they say, managers and workers who do other things as their primary duties have to do the bulk of the day-to-day activities of KM. However, this need not be a point of concern. A well designed and implemented KM program is fitted into and is an essential fiber in the fabric of the organization's work. In other words, KM should not become a workload burden on the people if it is fitted to support the natural way they work. (Wenger, McDermott and Snyder, 2002)

Certainly, roles are important. The writings reviewed for this research provided a variety of considerations – stakeholders, users, members, contributors, "knowledge owners," facilitators, managers, "Chief Knowledge Officers," "knowledge workers," and much more. In general, this author found most suggestions tended to fall into the categories suggested by the American Productivity and Quality Center (APQC, 2002): *Sponsor, Leader, Member* and *Facilitator*. Table seven provides a summary description of them. This serves as a guide for the organization, but consider that the APQC believes that these roles are integral to KM.

Role	Description
Sponsor	A sponsor can range from a high-level executive to a mid-level manager. This may be anyone who believes in the strategic value of the KM program, therefore willing to support it either by providing funding, visibility, or human resources to make it successful. They provide the strategic direction.
Leader	The leader is the initiator, the manager and the tactical direction for the KM program. Their goal is to ensure knowledge is being leveraged, knowledge flows are being harnessed and the organizational environment supports KM.
Member	The organizational member is the heart of the KM program. The member receives the KM program and ideals as integral to the way they work. In the members reside the knowledge that is the primary asset the organization uses for performance.

Role	Description
Facilitator	The facilitator is the glue of the knowledge management program. They are usually the only full time role in the KM program serving the organization in day-to-day capacities to ensure knowledge keeps flowing, and also to assess the success of the program.

Table 7.   Roles in managing knowledge (After: APQC, 2001)

Structure. Similar to *Roles*, *Structure* is an organizational element that is often neglected or taken for granted. This second component is largely related to what Sveiby (1997) describes as internal or external factors. In a metaphorical sense, it represents the "patterns," "texture" and "consistency" that make up the fabric of the organizational culture and relationships. It also represents – stealing from the software development community – the "usability" of the organization and/or the KM program from the *member's* perspective. Many of the environmental issues previously discussed have implications on this component. Housel and Bell (2001) believe KM is impossible apart from this which makes "knowledge accessible and useful." Therefore the structural component of KM must not be ignored.

Internally, the structure represents the organizational culture and the relationships held between people, processes and technology. The formal organizational structure is part of this, and easily represented by an organizational chart, but also consider the less formal (i.e., teams, project groups or functional community) and informal (i.e., self forming teams, naturally evolved partnerships or communities of interest) relationships that naturally form and evolve throughout any organization. The internal structure of the organization can be designed, for those things that are formal, and designed-for, for those things that are informal. Sveiby (1997) believes that the interaction and relationships that occur between people is circumscribed by this component of the organization therefore enacting an environment that will or will not support the flow of knowledge. In essence, he explains, the internal structure that is designed or designed-for is the main platform by which people express themselves within the workplace. Hence, the culture and

relationships held between people, processes and technology should be friendly to knowledge flows within the organization.

Externally, the structure principally represents the relationships the organization has with other organizations, customers, partners and competitors. Knowledge is frequently shared with these external entities, therefore in those relationships exists a flow of knowledge. In the case of sister organizations, subordinates, higher headquarters and partners, there is great value in extending the reach of your KM program. Also consider that a KM program can be used to intentionally hamper the flow of knowledge in relationships with competitors. This may be essential to maintain competitive advantage.

Work Processes. A well designed KM program attempts to support the natural ways people work. Wenger, McDermott and Snyder (2002) point out that organizations need to cultivate for the benefit of the members. They should be a natural part of organizational life. A knowledge manager should ensure that work processes are well fitted into the design of the KM program. "Since people are always busy and usually do not welcome extra work, knowledge management activities should be embedded as far as possible in work processes that need to be carried out anyway and are regarded as a natural part of one's job." (Rollet, 2003)

Technology. A typical mistake is to design a KM program around a technology implementation. It is not enough to just launch a web portal with a host of applications hoping people will use them. The information-focused view of KM places much more emphasis on technology. The knowledge-based view of KM sees technology as important, but in a supportive role. Nissen (2006) reminds us that people are central to the flow of knowledge, not technology. However IT does have a place in KM since it plays supportive role in organization work routines. Technology has actually enabled KM and Communities of Practice – which we'll see in the next chapter – to flourish due to their capability to support knowledge flow across an extension of time and space; same time/same place, same time/different place, different time/same place, and different time/different place. Therefore, IT can provide a substantial boost in work flow and knowledge flow. Consider also that the computational power of computers has little

relevance to knowledge work, but the communication and storage capabilities of networked computers make them knowledge enablers. (Davenport and Prusak, 1998) Technology is only a pipeline and storage system supporting knowledge flows. It does not create knowledge, does not store knowledge (refer back to Chapter II, Section D) and, as Davenport and Prusak (1998) believe, it "cannot guarantee or even promote knowledge generation or knowledge sharing in a corporate culture that doesn't favor those activities." For instance, they point out one example: "The availability of Lotus Notes does not change a knowledge-hoarding culture into a knowledge sharing one." Rollet (2003) summarizes this discussion:

> The first and most important lesson learned about technology is that it can never be a knowledge management solution in itself…it does have an important role to play as an enabler and catalyst…and entry fee…in many cases little progress will be made without it.

There is a diversity of KM frameworks. Shukla and Srinivasan (2002), for example, design their KM programs around People, Knowledge Architecture, and Systems and Technology. Citing a more divergent framework, Stankosky, Calabrese and Baldanza proposed one that considers Leadership, Organization, Technology, and Learning as the key components. (Booker, 2006) The selection of the framework used for this thesis is not meant to marginalize these others. This author found that the framework chosen is the most adaptive for a Community of Practice and supports those principles about knowledge and knowledge management that are consistent with a knowledge-focused view of KM. In relationship with other important points presented in this section, Figure 9 illustrates this framework. Table eight decomposes this framework for further understanding.

Figure 9.   Knowledge-focused framework for KM

KM Framework	Reference	Description
	Chapter II, Section F and Section C; Chapter III, Section C and Section D	"Knowledge Management" is about leveraging an organizational resource that is in the human mind. It is also about promoting learning toward doing. The organizational *member* is at the heart of the KM program since the organizational knowledge asset resides in them. The circulating arrows represent the knowledge flows that must be enabled for *learning* to occur toward *doing*. *Sponsors, Leaders* and *Facilitators* must be alert to the health of knowledge flows between the organization's members.
	Chapter III, Section D	*People* represent the central component of the "Knowledge Management" program. Its location in the center of this *knowledge-focused* KM framework highlights its distinction from the *information-focused* approach to KM. Roles are very important. Their neglect or abuse could negatively impact the KM program. The flow of knowledge between *Members* is at the heart. *Facilitators* monitor and energize knowledge flows. *Leaders* provide direction and find the right balance between learning and doing. *Sponsors* provide legitimacy and support to the program.
	Chapter III, Section D	The four components of a KM program operate as a cohesive system and should be addressed as an integrated problem since they are tightly interconnected. *People* is placed in the center to reflect them as the central component. *Structure, Processes* and *Technology* encapsulate *People* representing the supportive role they play in the KM program. *Sponsors, Leaders* and *Facilitators* must be alert to how these components support *People* and knowledge flows.
	Chapter III, Section B	"Knowledge Management" is about leveraging the organizational environment. People are more likely to thrive in fertile ground that promotes performance than in an environment that hampers performance. The circulating arrows represent the workplace (actual and virtual) as a complex and dynamic environment. It is constantly cycling through balancing or reinforcing events that either adds stability or change to the organizational system. *Sponsors, Leaders* and *Facilitators* must be alert to the environment so as to consider adjustments to the *People, Processes, Structure* and *Technology* components.
	Chapter III, Section D	This knowledge-focused KM framework serves as a summary to bring focus to those things - components, roles and the environment - that have implications on an organization's capacity to leverage knowledge toward preserving efficacious pursuits, deprecating ineffective practice and promoting innovation.

Table 8.   Knowledge-focused framework for "Knowledge Management"

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This section introduced a knowledge-focused framework, as decomposed in Table eight, reflecting the bringing together of the KM components – personnel, work processes, structure, and technology – in a complex and dynamic environment for leveraging knowledge. As previously discussed, although there is a diversity of thought on KM, this author found this construction to be most appropriate for consideration needed in a community of practice. Several authors agree and write (fully or in part) about this design; Rollet (2003), Nissen (2006), Sveiby (2001b) and Suresh (2002). Each element of this framework has significance and should be considered when designing and implementing a KM program. In summary:

- The methods and degrees of "Knowledge Management" implementations vary in design

- People represent the central element of the system

- Structure represents organizational culture and relationships

- KM should fit naturally into normal work process

- IT has a place since it plays supportive role in organization work routines

- Knowledge should be leveraged by bringing together the organizational elements – personnel, work processes, structure and technology – in consideration of the environment

E. KNOWLEDGE MANAGEMENT IN THE DEPARTMENT OF DEFENSE AND THE AIR FORCE

"Knowledge Management" is emerging in the military. Recall, from earlier discussions in this chapter, an information-focused view of KM prevails. This section does not explore the specific manners in which the Services have implemented KM. For that, there is a diversity of research that has been accomplished at the Naval Postgraduate School (NPS), the Air Force Institute of Technology (AFIT) and from other institutions that are useful (to name a few: Bartczak, 2002; Booker, 2006; Sasser, 2004; and Barber, 2003) This section does briefly provide an overview of the strategic environment in the military, and more specifically in the Air Force (AF). The point is to provide the reader some evidence of knowledge management in the Department of Defense (DoD) and the AF to better understand the strategic environment that may support or hinder its growth.

Searching through the space of academic, government and commercial web sites for relevant information (documents, briefings, and online writings) on KM in the

military is difficult. At the time of this writing, academic sources (journals and books) and public websites (mainly searches using Google and ProQuest) lack information regarding KM in DoD or the AF. Therefore, this research turns to evaluating material discovered on military websites. The AF Portal[19], AF Knowledge Now[20], and the Defense Technical Information Center's Scientific & Technical Information Network[21] provide the best information for this discussion.

Several thesis writings from students at the Air Force Institute of Technology provide great insight into different aspects of KM throughout the military. Although they offer a generalized view of KM, they frequently furnish threads of useful insights into specific elements of KM in DoD and the AF. Additionally, several official AF publications (memos, briefings, guidance and directives) provide a glimpse of the strategic attention KM is receiving. Drawing from these materials and this author's own experience, this evaluation is accomplished.

Knowledge management has received considerable attention at the highest levels in the Department of Defense. As an example, recent updates to Joint publications are rich with evidence. In the strategic document "Capstone Concepts for Joint Operations," the Chairman of the Joint Chiefs of Staff provides significant weight behind the need to manage knowledge. "The future joint force's key characteristics include being knowledge empowered…" (DoD, 2005). Further, it states as an imperative that a fundamental action needing to be taken by the joint force is to acquire, refine and share knowledge. Its relative importance against other key characteristics of a future joint force is demonstrated by the place it was given in this vision document – it sits at the top of the list.

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[19] The AF Portal is found at https://www.my.af.mil. Military members, DoD civilians and contractors must register to gain access.

[20] AF Knowledge Now is accessed through the AF Portal.

[21] DTIC's Public STINET is available to the general public, free of charge. It provides access to citations of unclassified unlimited documents that have been entered into DTIC's Technical Reports Collection, as well as the electronic full-text of many of these documents. It can be access at http://stinet.dtic.mil.

The future joint force must be:
Knowledge Empowered
Networked
Interoperable
Expeditionary
Adaptable/Tailorable
Enduring/Persistent
Precise
Fast
Resilient
Agile
Lethal

Table 9.   Joint Force Characteristics (After: DoD, 2005)

There are several other DoD documents[22] that give similar attention to the issue of knowledge and the need to harness it for enhancing the military capability. The Army, Navy and Air Force have each taken different approaches in addressing KM[23]. From this research, what is obvious is the varying degree of attention each Service gives this issue.

As of this writing, the AF is giving little strategic attention toward the issue of leveraging and managing knowledge. There are only two "top-level" documents that this author found that gives any notable attention to this subject. In the "Information Resources Strategy" and the "Information Resources Flight Plan," the Secretary of the AF and Chief of Staff endorse a vision that includes knowledge management as a goal for staff and lower level commanders to consider in developing the information management program and future information technology investments.

> Goal 7: Implement knowledge management practices and technologies to assure knowledge is identified, captured, and shared. (Department of the Air Force 2004). (note this was goal 7 of 9; the first six and remaining two places emphasis on information management)

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[22] A few other DoD level documents found to give knowledge management notable attention include: "Net-centric Environment Joint Functional Concept," and "Department of Defense Training Transformation Implementation Plan."

[23] AFIT Thesis "A Comparative Assessment of Knowledge Management Programs Across the United States Armed Services" by Patrick Booker provides a good comparative overview of all Service KM programs.

This document is principally motivated by a vision centered on managing information and implementation of information technology as an action needed to achieve operational success. Consider the following message published in the same publication:

> Knowledge management is a systemic process of identifying, capturing and transferring information that can be used to enhance performance or improve related tasks or processes. Knowledge management practices are an essential element to an overall information management strategy for the Air Force. Knowledge management is still in its infancy within the Air Force. However, we are making strong gains in this area… The focus is to facilitate sharing of enterprise intellectual capital, enable the Air Force to look beyond physical organizational assets, and put an enterprise focus on knowledge creation and sharing. Ultimately, knowledge management will better satisfy end-user information needs, and enable quicker and less costly access to enterprise information by using IT to leverage innovation in services, processes and knowledge creation. Knowledge management is a subset of EIM [Enterprise Information Management]. The essence of the Air Force EIM initiative is to provide quality information to the right person at the right time in a usable form to facilitate understanding and decision-making. It uses procedures and information systems to create, store, access, manipulate, distribute, protect, archive and dispose of information. (AF, 2004)

To achieve this "vision" for knowledge management the following objectives and actions are put forth:

OBJECTIVES
• Identify and adopt knowledge management best practices and technologies
• Facilitate identification, capture, transfer, and sharing of knowledge sources and/or content.
• Foster ongoing integration of new knowledge into work practices.
PRIMARY IMPLEMENTATION ACTIONS
• AFMC, as lead command, will establish a knowledge management pilot program.
• Create an Air Force electronic knowledge library, on the Air Force Portal, to share knowledge and support knowledge communities across the Air Force enterprise.

Table 10. AF KM Objectives and Actions (After: AF, 2002)

There are several other documents that contain references to KM, but all are in the same fashion as the "Air Force Information Strategy." Hence, KM is believed to be just a subset of the AF's Enterprise Information Management program. Further, there is little evidence to show that the Air Force takes KM as a key to achieving operational objectives.

Compounding with the lack of strategic vision for "Knowledge Management" in the DoD is also the incongruence in the understanding of what is knowledge and "Knowledge Management." Established previously, in Section B, KM throughout the DoD is emerging from the Service's IT functions – Army G6(CIO), Navy N6(SECNAV-CIO) and Air Force A6(XC) – resulting in what this author believes is the reason for the prevailing focus on information and technology. As a consequence, knowledge and knowledge management, as described in this writing and by many other authors (Nonaka, 1991; Nissen, 2006; Svieby, 2007; Drucker, 1969; and Wilson, 2006 to name a few) is notably different from the prevailing meaning held throughout the DoD. For instance, the Air Force describes knowledge as "Information from multiple domains that has been synthesized, through inference or deduction, into meaning or understanding." (AF, 2006) Absent here is the appreciation of the uniqueness of knowledge (Chapter II, Section B), its residence in the human mind (Chapter II, Section C) and other important characteristics that elevate knowledge as an organizational asset. Moreover, regarding "Knowledge Management," the AF defines it as:

> …a systemic process of identifying, capturing and transferring information that can be used to enhance performance or improve related tasks or processes…Knowledge management is a subset of EIM [Enterprise Information Management]. The essence of the Air Force EIM initiative is to provide quality information to the right person at the right time in as usable form to facilitate understanding and decision-making. (AF-CIO, 2004)

The other services follow a similar pattern. For example, the Navy, in Naval Doctrine Publication 6, acknowledges that information in naval doctrine generically refers to "all forms of description or representation, from raw data to knowledge and understanding." Indeed, this demonstrates what Wilson (2002) explains as a tendency seen in many organizations where KM is "being used simply as a synonym for

'information management'…search and replace marketing." Hildreth and Kimble (2002) similarly argue that "What is presented as being KM is often simply Information Resource Management (IRM) with the new label." This incongruence is notable throughout the DoD. What is presented in this writing (Chapters two and three) appears to be at odds with the prevailing understanding of knowledge and "Knowledge Management" in the military. Hence, KM as practiced to date does not appear to address the human-centered knowledge that is discussed in this research.

Truly, "Knowledge Management" has received little focused attention from senior leaders in the Air Force. Additionally, the prevailing understanding of knowledge and "Knowledge Management" is misleading and lacks appreciation for the uniqueness of knowledge. The evidence found shows that KM, as a strategic issue, is in its infancy if not in a very primitive stage of development. It seems that key AF senior leaders are endorsing a strategy that places "information flow" and technology as central. The Air Force executive commitment to KM is not apparent and cannot be determined by the documents reviewed for this paper. Booker (2006), in an AFIT thesis research, concluded that "the Air Force appears to have concentrated its efforts on making information more accessible and transferable to support its warfighter." As a consequence, this focus on information and information flows may have a greater influence on the emergence of an information-focused approach to KM.

In spite of the current lack of strategic vision for a knowledge-focused approach to KM in the AF there are several things that are emerging and should be seen as encouraging developments:

- Establishment of *The Center of Excellence for Knowledge Management* is championing KM throughout the AF

- The *AF Portal* is emerging as a gateway for AF work-flows, collaboration and information exchange

- *Air Force Knowledge Now* is promoting KM and Communities of Practice

- Communities of Practice are emerging as a KM tool

- AF-Chief Information Officer is pursuing executive level transformation

The Center of Excellence for Knowledge Management. CEKM was established in 2004 by the AF-CIO as a "cost-effective approach to Knowledge

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Management." (AF, 2004b). This occurred after he took notice of a knowledge sharing and community of practice program that was developed and run by Air Force Material Command for their personnel. After it proved to be "successful" the AF-CIO asked the AFMC Vice Commander to donate this AFMC program for Air Force wide expansion. As a result, the AFMC unit was renamed the CEKM and charged to champion KM in the AF and run the expanded AF Knowledge Now (AFKN) web portal. Capt David Sasser (2006), CEKM's senior knowledge management analyst, highlighted that their primary goal is to promote knowledge management throughout the AF through AFKN and KM education. A significant limitation CEKM is experiencing is lack of funding – which may be a consequence of the poor executive support. The AF-CIO had promised to match the funding AFMC had been investing in the program. However, this additional funding was curbed to meet other AF requirements. As a result, CEKM is currently limited to promoting KM under a tighter budget.

The Air Force Portal. The AF Portal was created to provide Airmen a gateway for single point of entry and log-on for all web enabled information and services in the AF. The long term goal is to have most AF applications, services and information accessible through this portal with a single log-on. At Appendix B are screen shots of the AF Portal. Many applications and services can now only be accessed through the portal. As a consequence, the portal has readily been adopted for daily routine tasks by members of the AF. The implication here is that the AF has a well established and supported technology implementation that can be used to promote information flows that can support the flow of knowledge.

Air Force Knowledge Now. As previously mentioned, AFKN was an earlier program developed and funded by AFMC specifically to share acquisition and maintenance knowledge, and to promote communities of practice for its subordinate functions. The program was expanded Air Force wide in 2004 after the AF-CIO took notice of its success. AFKN's main purpose is to connect people with people through information sharing. Reference Appendix C for a screen shot of the AFKN website. Presently, AFKN has over 185,000 registered users, growing at 5,000 per month, in over 6,000 Communities of Practice throughout the Air Force and DoD. (AFKN, 2007) The

implication of this is that AFKN is the most prominent evidence of KM in the AF and can be a driving force to further KM in the AF.

Air Force Communities of Practice. Another significant piece of evidence that KM is emerging at the grassroots level of the AF is the evolution of communities of practice (CoP). As previously mentioned, there are over 6,000 communities existing through AFKN. It is uncertain how many of these communities are effective and active. In a 2003 AFIT thesis study, Capt Jason May explored the maturity levels of 46 AF CoPs. He concluded that the average CoP, at the time, was:

> …in the very early stages of evolution, and the extent of implementation for specific attributes/capabilities was found to be minimal. The implications of this research show…there are wide range of actions that can be taken to improve the efficiency and effectiveness of existing CoPs. These actions include increasing leadership involvement and support, increasing membership education and training, defining more clearly the purpose/objectives of each CoP, and implementing easier technology tools for navigating the CoP collaborative electronic workspace.

Indeed, CoPs can have a significant role in the AF's knowledge management program. This author believes CoPs have further developed from the time of Capt Mays' study. One example is the Financial Management CoP. This community has evolved into one of the most successful CoPs on the AFKN portal. This community took several important steps to employ their program: they publish a strategic vision and purpose for the CoP, they hired a Chief Knowledge Officer to cultivate the community, they adapted the CoP virtual workspace to naturally fit into routine processes, and they are starting to promote reinforcing rewards (evaluations and recognition) for using the CoP. Reference Appendix D for a screen shot of the Financial Management CoP. The implication of this is that CoPs are emerging in the AF and if implemented effectively can be an important tool in the AF KM program.

AF-Chief Information Officer is pursuing executive level transformation. A positive strategic note in the AF KM program is that the AF-CIO is attempting to drive a transformation effort to mesh KM in strategic thinking and planning. At present, several documents have been drafted and are being reviewed at lower levels of the Air Force for eventual push towards endorsement by the Secretary of the Air Force and the Chief of

Staff. The "Air Force Knowledge Based Operations Strategic Plan" has been written and is currently in draft form as of this writing. Capt Sasser (2006) emphasized that this strategic plan is hoped to provide a much needed boost for the AF's KM program. One highlight from this draft publication:

> "Knowledge Based Operations" is effective use, management, and presentation of information across the Air Force enterprise: a One Air Force - One Enterprise vision. It is a new approach and cultural shift to how the Air Force will conduct operations and day-to-day business. KBO is not an evolution of what the Air Force recognizes today as Information Management. The Air Force must transform the use and management of information into warfighting enablers across the continuum of Air Force, joint-, and coalition-based missions. KBO is far more than systems and applications; it transcends a systems approach to provide integrated process engineering as well as control and management disciplines. (AF, 2006b)

Although this draft plan does demonstrate a positive progression of KM, it is clear that the foundational belief for this strategy is similar to previous documents. Information management remains central and knowledge management is merely a supportive element to "information superiority." The implication of this is that the Air Force strategy for KM is the weakest link in achieving an enterprise wide KM program in the AF.

The purpose for this section is to explore knowledge management in the DoD and the Air Force. Again, this is not a thorough evaluation and is limited in achieving a precise and accurate understanding of the topic. However, it does provide an adequate appreciation of a few major features of the DoD and AF KM environment. Therefore, evaluating what is learned here against the KM framework presented previously in Figure 9:

- **Personnel.** People are central in a KM program. Knowledge resides and flows between people. Unfortunately, in the Air Force, information and technology is central. No evidence is found to suggest that people have been considered as an essential element in KM. The prevailing theme is that people are considered end-users that would benefit from an effective information management program.

- **Work Process.** At the strategic executive level, knowledge flows are never addressed. Consequentially, work processes are primarily seen as driven by expected outcomes and process management. In spite of this, at

the grassroots level, evidence was found of managerial intervention specifically addressing the flow of knowledge. Communities of practice, virtual work-spaces and knowledge sharing are clearly being used to influence the flow of knowledge to impact work processes and expected outcomes.

- **Structure.** Evidence is found of the free flow of knowledge across the extension of space, time and organizational boundaries. The use of the AF Portal, AFKN and Communities of Practice demonstrated the potential for promoting knowledge flow across the structural element. However, functions and organizations are not participating in an enterprise wide KM program. Culture and relationship issues are absent from any discussions or documents. Until the AF implements an integrating enterprise-wide KM strategy the structural element may continue to suffer.

- **Technology.** The AF is doing well with technology. They place much emphasis on the proper planning, acquisition and implementation of IT solutions. However, this emphasis is at the expense of the other elements of a KM program. People, processes and structure are expected to adapt to technology. For a KM program, the Air Force needs to minimize the importance on technology and rethink the supportive role IT plays in the flow of knowledge.

- The Department of Defense and the Air Force, in general, have a primitive understanding of "Knowledge Management." KM has emerged in a supportive role overshadowed by the prevailing emphasis on information management and information superiority.

- The Air Force needs to start from the top to develop an enterprise wide knowledge-focused approach to KM.

IV. COMMUNITIES OF PRACTICE AS A KNOWLEDGE MANAGEMENT PROGRAM

A Community of Practice (CoP) is an approach to "Knowledge Management." Depending on the orientation of the organizational KM program, a CoP can emerge as an information-focused or as a knowledge-focused forum. Recall from Chapter III, Section A, the information-focused perspective seeks efficiencies in performance through accessibility to information, avoidance of duplication of effort, and timeliness in finding important information. Therefore, investments are made in technology and information systems. In contrast, the knowledge-focused stream of thought seeks effectiveness in performance through leveraging knowledge, enabling knowledge flows, and promoting creativity and innovation. Therefore, investments are made in people, trust, culture and learning. Drawing from this and what is learned – about knowledge – in Chapter II, this author posits that a knowledge-focused implementation of a CoP is most beneficial to learning and knowledge flows since this stream of thought seeks to connect people to promote learning and an effective capacity to act. In comparison, the former perspective seeks to connect people to information as the means to achieve an efficient capacity to act. Both are useful. However, since the knowledge-focused approach places greater weight on valuing knowledge as a uniquely human feature (vs. knowledge as an object), this research considers it over other approaches toward sustaining performance, deprecating ineffective practice and promoting innovation. This discrimination is not intended to marginalize other approaches, but reflects a value judgment made by this author which considers it a fitting approach to "Learning by Interacting" discussed in the previous chapter.

Consider the abundance of case studies (To name a few: Army company commanders in Dixon et al., 2005; Buckman Labs in Newel et al., 2002; and Clarica Life Insurance Company in Saint-Onge and Wallace, 2003) which demonstrate the advantage knowledge-focused CoPs have in leveraging knowledge for performance improvement. McDermott (2001) also points out that information-focused KM often "results in information junkyards and empty libraries." Therefore, he suggests that many companies are discovering that the real gold in KM is not in "distributing documents or combining

databases" but in sharing ideas and insights that are not documented and hard to articulate. Presently, CoPs are emerging throughout the military. In the Air Force, they are growing at a rate of 5,000 new participants each month. (AFKN, 2007) It is uncertain how many of them are being cultivated in a knowledge-focused approach. An AFIT thesis study suggests that most of the Air Force CoPs are in the early stages of evolution and just beginning to develop and grow. (May, 2003) Therefore, this research adds further understanding to this issue toward benefiting a positive evolution of CoPs in the military. To this end, this fourth chapter explores the knowledge-focused perspective, introduced in Chapters II and III, for a Community of Practice by exploring key issues, and design and evolution of a CoP. By doing so, it rounds out our understanding of knowledge and how to leverage it for the benefit of the organization.

A.   COMMUNITIES OF PRACTICE

Communities of practice are not new. Recall, from Chapter III, the deeply rooted history behind managing knowledge. CoPs share this same ancestry. Wenger and Snyder (2000) believe it is important to understand that CoPs were common as far back as ancient times – they point to Greek craftsmen and guilds from the Middle Ages. Today, since the primary "output" – knowledge – is intangible, they have found that many perceive CoPs as just another "soft" management fad. Although CoPs have been around for a long time, the term has only recently entered the business vernacular. Many credit Etienne Wenger and Jean Lave as first using the concept in 1991 in their work "Situated Learning: Legitimate Peripheral Participation." (Brown and Duguid, 1991) Indeed, as we are seeing in the military, CoPs are popular in the private sector and in government. (APQC, 2001) An interesting observation made by this author while reviewing literature is the relative closeness in understanding of what a CoP should be. In general, most see them as a group of people who share their practice. Not to be confused with other kinds of groups, such as project teams or communities of interest, Nickols (2006) developed a matrix, Table 11, to help understand the distinctions. Each type is assessed based on six dimensions that Nickols believes to be defining characteristics in such a comparison.

	Purpose	Membership	Authority	Allegiance	Cohesion	Duration
Organizational Unit	Results from resources	Assigned	Positional	Upward	Leadership & Relationships	Ongoing - Until Reorganized
Operating Team	Ongoing tasks	Assigned	Positional	Upward	Task Dependencies	Ongoing - Until Reorganized
Task Force & Project Team	Time-bound tasks/results	Assigned	Positional	Upward	Leadership & Relationships	Inception to Completion
Faux Team	Appearances	Assigned	Non-existent	Fragmented or Non-Existent	Management Pressure	Until Disbanded or Fades Away
Social Network	Information Sharing	Invitation & Approach	Information	Norms	Value of the Information	Ongoing - Until It Dies Out
Community of Interest	Stay Abreast	Invitation & Approach	Knowledge	Peers	Level of Interest	Ongoing - Until It Dies Out
Community of Practice	Develop Expertise	Invitation & Approach	Expertise	Practice	Identity	Ongoing - Until It Dies Out

Table 11.   Comparisons of various kinds of groups (From: Nickols, 2006)

Most agree as to what is a Community of Practice. Wenger, McDermott and Snyder (2002) perhaps have the most cited definition for one:

> …groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis…As they spend time together, they typically share information, insight, and advice. They help each other solve problems. They discuss their situations, their aspirations, and their needs. They ponder common issues, explore ideas, and act as sounding boards…However they accumulate knowledge, they become informally bound by the value that they find in learning together.

Newell, Robertson, Scarbrough and Swan (2002) provide further insight relative to a CoP's self-determination:

> …based not on interest or geographical area but on practice – this might be a work practice or hobby, but it involves an activity which others also take part in. And by being a member of that community, individuals are able to develop their practice – sharing experience and ideas with others involved in the same pursuit…[a CoP] does not appear in an

organizational chart or in different business process designed by management…do not recognize a boss. They are responsible only to themselves. Individuals become involved voluntarily because they have something to learn and to contribute.

The American Productivity & Quality Center is a benchmarking and best-practice non-profit that partners with many major corporations and government agencies – the Army, Air Force and Navy included – helping them discover effective methods for performance improvement. Many rely on the APQC as a clearinghouse for research on KM and CoPs. The definition the APQC (2001) use provides added insight by including the time and space dimension:

> Communities of practice are groups of people who come to share and to learn from one another face-to-face and virtually. They are held together by a common interest in a body of knowledge and are driven by a desire and need to share problems, experiences, insights, templates, tools, and best practices…community members deepen their knowledge by interacting on an ongoing basis and, over time, develop a set of shared practices."

This author did not find any notable diversity in thoughts about Communities of Practice. The previous definitions were used here to highlight a few of the minor deviations in thought. Drawing from them and the fundamental concepts about knowledge from Chapter II (it is unique from data and information, resides in the human mind, is tacit and explicit, is perishable, and must flow to be useful), the following working definition is developed to be used for this thesis:

> A community of practice is a group of people mutually interacting and communicating to learn from each other. A common practice, interest, issue or problem creates an informal bond that is fed by a desire or need to share and learn toward adding to individual knowledge and improving the overall practice.

> Members – face-to-face or virtually – share information and what they know, explore new ideas and help each other solve problems. Members get involved voluntarily, do not recognize a community hierarchy or authority, and are not bound to deadlines or commitments. Organizations benefit when they cultivate and support the community.

> Ultimately, the flow of relevant knowledge sustains the existence of a community of practice.

As was done with KM, this working definition is heavily influenced by the knowledge-focused stream of thought. It also continues to recognize the importance of the information-focused view since it provides for elements that critically support cultivating knowledge in the organization. The remainder of this chapter uses this as the platform to explore this topic by developing further three key concepts infused in this working definition and that are useful for constructing a Community of Practice.

1. Communities of practice are social entities

2. Communities of practice need to be cultivated and supported

3. Communities of practice are sustained by the flow of knowledge

B. COMMUNITIES OF PRACTICE ARE SOCIAL ENTITIES

A community of practice is a group of people mutually interacting and communicating to learn from each other. It is principally a social undertaking. A powerful example of this is found in the CoP formed for Army company commanders. This community of Army officers was formed out of a need to share and learn. Dixon et al. (2005) describes how this community of professionals emerged with a purpose to share, encourage, support, question, discover and reason together. Colonel George Forsyth, United States Military Academy Vice Dean of Education, after observing this community, commented he believed the essence of this forum was about "professionals sharing the wisdom of practice and creating new insights about company-level leadership." (Dixon et al., 2005) In another example, an often used case study of a community in action is that of the customer service representatives who repair the photocopiers of Xerox customers. Newell et al. (2002) recount this 1990 study by Julian Orr:

> From the management viewpoint, a rep's work is well-defined and largely independent. Customers with problems call the Customer Service Centre, which in turn notifies a rep. He or she goes to the customer's site and, with the help of the error codes displayed and a problem-solving manual diagnoses the problem and applies the specified fix. When Orr looked at the reps' work more closely, however, he found that they did not operate independently at all. Their working day typically revolved around informal meetings with other reps over breakfast, lunch and coffee. At these meetings the reps would continuously swap war stories about malfunctioning machines that could not be repaired simply by going through the know-what of the repair manual. Orr found that one of these

informal conversations would be worth hours of training. While chatting, the reps posed questions to each other, offered solutions, laughed at mistakes and generally kept each other up to date about what they knew and what they had learned on the job. As a result, knowledge was shared extensively amongst the community about ways of dealing with unusual glitches and problems that were simply not covered in the photocopier repair manual.

Generally, informal 'social' gatherings of this kind run counter to an organization's desire to control activities and resources. A typical reaction is to see them as a threat to efficiency. For this reason, Xerox initially sought to eliminate the informal meetings but found that the number of repeat calls to deal with the same problems increased. Knowledge was no longer being shared between the representatives due to a managerial barrier to knowledge flows. Recall from Table four that parsimony adds to the stickiness of knowledge. For Xerox, greater productivity in terms of hours on the job was actually leading to greater inefficiency in terms of solving customer problems. As a result, they quickly relented and allowed the informal meetings to occur. (Newell et al., 2002)

Drawing again from Lave and Wenger (1991), they see the acquisition of knowledge as a social process where people could participate in communal learning at different levels depending on their level of authority or seniority in the group. Central to this is the thought that a CoP is a means of acquiring knowledge where members move from peripheral to full participation in the community as they learn from others. They called this process *Legitimate Peripheral Participation* and use, as examples, knowledge flows demonstrated in situations such as apprenticeships of Mayan midwives in Mexico, work-learning settings of U.S Navy quartermasters, and among non-drinking alcoholics in Alcoholics Anonymous. (Hew and Bloomington, 2006) The point here is that a CoP is largely a social group, and is better characterized by the interactions and communications that occur than by any other thing, such as technology or document archives. Consider again the spectrum of tools for learning at Figure 10. Many of them are principally social events – storytelling, interaction, observation, consideration and conversation for example. Members of a CoP learn by interacting. Therefore, consider these learning tools, encircled in Figure 10, as a tool set for promoting knowledge flows in a CoP.

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Hence, a CoP is principally a social undertaking that requires focus on the social implications of the KM framework of people, work processes, structure and technology.

Figure 10.   Tool set for communities of practice

In summary:

- A Community of Practice is a social undertaking

- Members of a CoP learn by social interactions

- CoPs may be a threat to efficiency due to their social nature, but they promote effectiveness

C.   COMMUNITIES OF PRACTICE NEED TO BE CULTIVATED AND SUPPORTED

Many agree that a CoP should be self-generating, self-organizing, informal and autonomous. (Wenger, McDermott and Snyder, 2002; Newell, Robertson Scarbrough and Swan, 2002; and Hislop, 2005) Wenger, McDermott and Snyder (2002) emphasize that CoPs are a natural part of organizational life. "They will develop on their own and many will flourish, whether or not the organization recognizes them." Others believe that they can also be formally established and guided. (Garcia and Dorohovich, 2005; and Saint-

Onge and Wallace, 2003) Using their experience with CoPs, Jill Garcia and Michael Dirohovich in "The Truth About Building and Maintaining Successful Communities of Practice", believe that:

> …successful communities are more likely to emerge when there is a systematic process for establishing, growing, and sustaining CoPs in a business setting; and viable CoPs in the work place need structure, direction, and help to set a solid foundation for success. (Garcia and Dirohovich, 2005)

These same authors (Wenger, McDermott and Snyder, 2002; Newell, Robertson Scarbrough and Swan, 2002; Garcia and Dirohvich, 2005; and Hislop, 2005) also agree that a CoP must be nurtured and supported by those who fill the roles of the *People* component in a KM framework (see Figure 9) – *Sponsor, Leader, Facilitator* and *Members*. The thought of nurturing and supporting a community of practice was first introduced by Wenger, McDermott and Snyder (2002). They described this more as an active act of "cultivating" a community. This concept is based on the premise that the good health of a CoP is promoted by voluntary engagement of its members, supportive internal leadership, and some measure of informality and autonomy. In other words, second-guessing or over-managing a community could strangle it. They describe cultivating a CoP using analogy:

> A plant does its own growing, whether its seed was carefully planted or blown into place by the wind. You cannot pull the stem, leaves, or petals to make a plant grow faster or taller. However, you can do much to encourage healthy plants: till the soil, ensure they have enough nutrients, supply water, secure the right amount of sun exposure, and protect them from pests and weeds. There are also a few things we know not to do, like pulling up a plant to check if it has good roots.
>
> Similarly, some communities of practice grow spontaneously while others may require careful seeding. Yet in both cases, organizations can do a lot to create an environment in which they can prosper: valuing the learning they do, making time and other resources available for their work, encouraging participation, and removing barriers. Creating such a context also entails integrating communities in the organization – giving them a voice in decisions and legitimacy in influencing operating units, and developing internal processes for managing the value they create.

They admit that this cultivation is hard work. Garcia and Dorohovich (2005) further point out that implementing a CoP, although difficult, is worth the effort. The benefits of having a well implemented CoP greatly outweigh the time, attention and effort needed to implement one. They point to the value they observed by actively and deliberately nurturing and supporting one community. Table 12 summarizes the appraisals they noted in the Defense Acquisition community from a cooperative effort to develop a sustainable CoP. This example represents the results achieved from paying attention to elements of a community – such as *people, culture, structure* and *technology* – in the same animus as described by the analogy offered by Wenger, McDermott and Snyder (2002).

Defense Acquisition Community of Practice

Value Proposition

• Facilitates the rapid identification of individuals with specific knowledge/skills;

• Fosters knowledge sharing across organizational boundaries;

• Promotes and facilitates the capture and reuse of existing knowledge assets and retention of organizational memory;

• Provides a safe environment to share problems, challenges, and test new ideas;

• Facilitates collaboration across different time zones;

• Fosters innovation (within and across organizational boundaries);

• Facilitates faster, better-informed decision making;

• Reduces learning curves for new employees;

• Improves the quality of products developed;

• Fosters interaction between new/more junior employees and senior/more experienced practioners;

• Facilitates the building of mentor-protégé relationships;

Table 12.   Community of Practice value proposition, Defense Acquisition community (After: Garcia and Dorohovich, 2005)

This value proposition is appealing, but only represents the experience in one community. Several others mention of similar successes when their CoP(s) were given attention as Wenger, McDermott and Snyder (2002) suggest. Saint-Onge and Wallace (2003) write about similar results. At Clarica Life Insurance Company, they surveyed the members of the Agent Network CoP to find out if their cultivating effort was producing results. Table 13, provides a glimpse of the positive feedback the community members found to be the most valuable aspects of the CoP.

Clarica Life Insurance Company
Agent Network Community of Practice

Value Proposition

• Provided an opportunity to grow personally, professionally and technically

• Introduced new ideas, approaches, and strategies

• Created a network of colleagues who understand their issues and challenges

• Provided them with links to product and market specialist

• Helped clarify something they didn't understand before

• Made a difference to a sale

Table 13.   Community of Practice value proposition, Clarica Agent Network (After: Saint-Onge and Wallace, 2003)

In another example, Dixon et al. (2005) report that the Army company commander CoP has enabled members to gain access to each other and thereby tapping into the collective knowledge of the members. Further, they suggest that much of the value in this community goes unnoticed or less visible; such as the many conversations company commanders are having with each other as a result – "by email, on the telephone, gathering around a HMMWV, and in CPS, mess halls and FOBs around the world." Captain Jason May, in a 2003 AFIT thesis research, found many of the same benefits in his review CoPs. Indeed, cultivating and supporting a community is beneficial.

These three examples are indeed models of CoPs that have been recognized and valued by its members. Garcia and Dorohovich (2005), for the Defense Acquisition CoP, Saint-Onge and Wallace (2003), for the Agent Network CoP, and Dixon et al., for the Army company commander CoP, write about the efforts made to create an environment where community growth is promoted. As Wenger, McDermott and Snyder (2002) suggested, cultivation of a CoP expresses the creation of an "environment in which they can prosper: valuing the learning they do, making time and other resources available for their work, encouraging participation, and removing barriers." It is worth mentioning here that there are other factors that also contribute toward the efficacy of a CoP, such as considerations made by the information-focused approach (i.e., information system usability or information availability). However, due to the scope of this research, the "cultivation" approach suggested here is used since it is fundamentally grounded in those principles discussed in Chapters two and three regarding knowledge, knowledge flows and leveraging knowledge. No other alternative approach was found to capture these same principles.

Cultivating a Community of Practice is not an easy task. Drawing again from the gardening analogy, it requires preparation of the soil, planting, encouragement, tending, feeding and much labor. Problems should also be expected; such as weeds, bad weather, or intruders. Similarly, a community must confront several issues that will act counter to its healthy growth and sustainment. McDermott (2001) points out four key challenges most CoPs encounter that play against it and drive the need for tending of the community. For managers, the challenge is to communicate that the organization values sharing knowledge. For the community members, the challenge is to create value and insure that the community shares "cutting edge thinking, rather than sophisticated copying." About technology, the challenge is to design human and information systems that not only make information available but more so help community members think and learn together. And at the personal level, the challenge is to be open to the ideas of others and maintain a thirst for developing the community's practice.

The challenges McDermott (2001) describes play against the firm, well colored and vibrant growth of a community. Wenger, McDermott and Snyder (2002) call this the "aliveness" of the community; "…a good community design can invite, even evoke,

aliveness." The best indicator for "aliveness" is active, meaningful and effective interaction between its members. Consider then the level of community energy that could be achieved if the interactions represented effective flows of knowledge – learning. They offer seven principles for cultivating a community that they believe best address challenges and promotes "aliveness:"

1. Design for evolution. Continuing with the gardening analogy, a community should be seen as organic. It grows or dies, depending on internal and external conditions. As such, they suggest that designing a community is more a matter of shepherding their evolution than creating them from scratch. Communities usually begin from existing networks and relationships – formal or informal. Therefore the purpose of a CoP "design is not to impose a structure but help the community develop." The essence in designing for evolution is to welcome the evolution that learning ushers in. Accordingly, throughout its lifespan, an "alive" community should "reflect on and redesign elements of themselves throughout their existence." The key, they say, is to combine design elements in a way that catalyzes community development. For example:

> In one case, the coordinator and core members had many ideas of what the community could become. Rather than introduce those ideas to the community as a whole, they started with a very simple structure of regular meetings. They did not capture meeting notes, put up a Web site, or speculate with the group on 'where this is going.' Their first goal was to draw potential members to the community. Once people were engaged in the topic and had begun to build relationships, the core members began introducing other elements of community structure – such as Web site, links to other communities, projects to define key practices – one at a time. (Wenger, McDermott and Snyder, 2002)

2. Open a dialogue between inside and outside perspectives. An effective design is built on the collective experience of its members. The community "insider" is most knowledgeable about the issues important to the community. This deep understanding of the issues is beneficial since they contribute to learning through sharing of insights, experience and opinion. However, when a community is shielded from the outside perspective the possibilities are limited. Recall what Fahey and Prusak (1998) referred to as "competency traps" – doing the wrong thing well. Also consider what Newell, Robertson, Scarbrough and Swan (2002) consider is a common pitfall for teams

– "groupthink." These are problems that can plague a community when it is limited to only an inside perspective. Exploration is a good way to address this issue in a KM program. In a CoP it is also addressed by opening up the community to an outside perspective. Therefore a good community design brings people and information from outside the community into the dialogues, interactions and events. By doing so, Wenger, McDermott and Snyder (2002) believe it will help the internal community members see the possibilities. For example:

> The well-connected leader of a new community on emerging technology was concerned about how to develop the community when many of the "prima donnas" of the industry were outside his company. When he saw how a similar community in another organization was structured to involve outside experts in multiple ways. He started rethinking the potential structure of his own community. He realized that the key issues in his community were less about technology and more about the business issues involved in developing the technology. This understanding of the business perspective of the other community gave him a sharper sense of the strategic potential of his own. (Wenger, McDermott and Snyder, 2002)

3. Invite different levels of participation. There are different levels of community members – *core, active, peripheral* and *outsider.* Each participate for different reasons – "some because the community directly provides value, some for the personal connection, and others for the opportunity to learn or improve their skills." Depicted in Figure 11, these levels of participation should be seen as a healthy requirement for the wellbeing of the community. The *core* group represents the heart of the community and is those who actively participate in discussions, take on projects and topics and move the community in a learning agenda. The *active* group participates occasionally, but without the regularity and intensity of the *core* group. The *peripheral* group rarely participates and normally sits on the sidelines observing. Leaders may see this group as a waste due to a "half-hearted" involvement. However, Wenger, McDermott and Snyder (2002) warn that they are vital and are not as passive as they seem. "They gain their own insights from the discussions and put them to good use…they are learning a lot." Again, the purpose of a KM program is to promote the flow of knowledge. Consider that sideliners learn through *legitimate peripheral participation* (recall this discussion in section B introduced by Lave and Wenger (1991)). Outside the community are *outsiders* who have interest in the community – customers,

suppliers, neighbors – and from which the community can benefit from. They suggest that the key to community participation is to design community activities that allow participants at all levels to feel like full members.
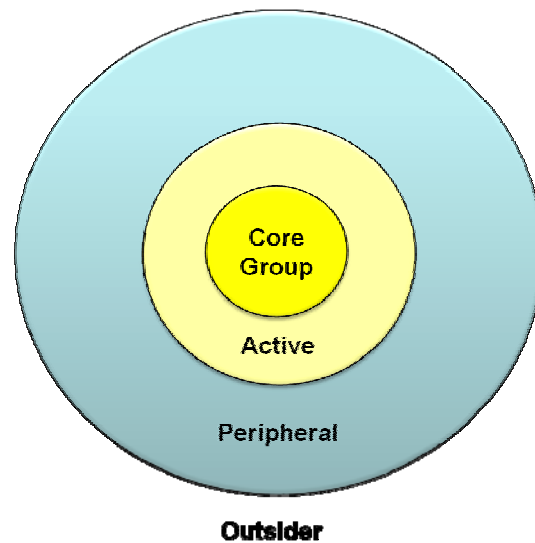
Figure 11.   Degrees of community participation (After: Wenger, McDermott and Snyder, 2002)

4. Develop both public and private community spaces. Public and private forums are important. Communities tend to focus more so on public events due to their obvious place in promoting interaction. However, Wenger, McDermott and Snyder (2002) suggest that the heart of the community is the web of relationships among community members and the one-on-one exchanges that naturally occur in a work day. "When the individual relationships among community members are strong, the events are much richer." Therefore, they advise that the key is to orchestrate activities in both public and private spaces that use the "strength of individual relationships to enrich events and use events to strengthen individual relationships."

5. Focus on value. Communities of Practice thrive when they deliver value to its members and the organization. However, it is a difficult matter to quantify a "return of investment" for a community. Here, they suggest communities should create opportunities and relationships that help their potential value emerge and enable them to discover new ways to harvest it. The real value of the community is not always evident

immediately. Tracing the impact of an interaction, a discussion or something learned may takes time and attention. Therefore, the community should encourage members to be explicit about the value of the community in discussions, interactions, announcements and marketing.

6. Combine familiarity and excitement. A community should offer the comfort of familiarity but also provide members with enough interesting and varied events to keep new ideas and new people cycling through the community. The community is a neutral place where members can decide to participate separate from the everyday work pressures. They can interact in discussions and issue without the fear of being entangled in them. The community also should provide for divergent thinking and activities. "Routine activities provide the stability for relationship-building connections; exciting events provide a sense of common adventure."

7. Create a rhythm for the community. The "aliveness" of the community can be measured by its rhythm. The rhythm represents the "syncopation of familiar and exciting events, the frequency of private interactions, the ebb and flow of people from the sidelines into active participation, and the place of the community's overall evolution." When the rhythm is too fast the members feel overwhelmed and stop participating. When it's too slow the community feels sluggish.

The concept of cultivating a community is based on the premise that the good health of a CoP is marked by voluntary engagement of its members, supportive internal leadership, and some measure of informality and autonomy. Additionally, cultivation occurs at all levels of the organization and the community – where ever the *sponsors, leaders, facilitators* and *members* reside. Indeed, cultivating a community is hard. However, presented in this section were examples of various communities that found value in cultivating their activities. Albeit the challenges discussed, Wenger, McDermott and Snyder (2002) offer several principles that provide a strategic approach to cultivating a community toward success and "aliveness." In summary:

- The community should be cultivated by the *Sponsors, Leaders, Facilitators* and *Members*

- Cultivating and supporting a CoP is beneficial – value should emerge

- Challenges in community growth can be addressed by applying the seven principles for cultivating a CoP

D. COMMUNITIES OF PRACTICE ARE SUSTAINED BY KNOWLEDGE FLOWS

A Community of Practice is an approach to "Knowledge Management" where learning is central when using a knowledge-focused approach. The previous section introduced the concept of "aliveness" in a CoP. This idea that a community can have active, meaningful and effective interaction between its members is ideal. However, many fail to achieve this state of presence. The APQC (2001), from a study of CoPs in 12 organizations, found that communities can start and sustain themselves through the cultivation discussed previously, but without a culture that supports the flow of knowledge and learning it is difficult for them to survive or be useful (It is worth noting here that communities have a lifespan – this point will be discussed further in Section F). Fahey and Prusak (1998), from their experience, point out that a pervasive KM error is when organizations emphasize the accumulation of information and knowledge to the detriment of knowledge flow. The notion of flow, discussed in Chapter II, is a difficult concept to understand and operationalize. However, consider the vital importance flows of knowledge play on organizational performance and individual learning. Recall, from Nissen (2006) that "knowledge flows always lie on the critical paths of workflows, hence, organizational performance." Therefore, this concept is worth understanding further and seeing how it applies in a Community of Practice.

Drawing again from Fahey and Prusak (1998), they offer several reasons to explain the general neglect of knowledge flows in an organization: managers simply do not understand the nature of knowledge – especially the tacit type, and failing to recognize the importance of exploration. For instance, in reviewing "Knowledge Management" in the DoD and AF (Chapter III, Section E), this author found no mention of learning or discussions regarding flows of knowledge in any literature. Moreover, as established in Chapter III, the prevailing understanding of knowledge is indeed

undeveloped. The private sector fairs much better at the strategic level. This author found that those private sector CoPs examined for this research tended to emphasize interaction, learning and the flow of knowledge. As evidence, this author found little trouble in finding knowledge-focused communities that emphasized the flow of knowledge:

Buckman Labs. (adapted from Newell, Robertson, Scarbrough and Swan, 2002; and www.buckman.com) Established in 1945, Buckman Laboratories is a manufacturer of specialty chemicals for water treatment, pulp & paper, and leather industries. The company was founded on its unique ability to create and manufacture innovative solutions to control the growth of microorganisms. As a global business, they produce over 500 different products and employ over 1,300 people in over 70 countries.

Bob Buckman established early on that the basis of his company's competitive edge was knowledge. Their first focus was to connect their worldwide associates with a global knowledge transfer network they called K'netix Knowledge Management System. They refocused their Research and Development section and renamed it the Knowledge Resource Center to facilitate learning across the company. Along with traditional collaboration methods – phone, email and meetings – K'Netix was designed to encourage discussion forums to allow employees to share experiences in particular areas and promote group problem solving, and the sharing of new ideas and knowledge. Furthermore, they understood the importance of fostering a knowledge-sharing culture. There was an attempt to change the "hearts and minds" of the employees, which turned out to be a major challenge. Buckman sought to create a culture in which associates who shared their knowledge would be the most influential and sought after members in the company.

> This concern with culture reflected Buckman's belief that creating new knowledge involved not only objective, external information, but also tacit and highly subjective individual insights, intuitions and hunches. He sought to ensure that creating and sharing knowledge was no longer seen as the exclusive responsibility of the R&D department but rather a responsibility of all employees. (Newell, Robertson, Scarbrough and Swan, 2002)

A code of ethics was presented as the "glue" that would hold the company together. A reward system was established to encourage knowledge sharing and learning. Sanctions were even employed to reinforce behavior. As a result, their effort to stigmatize knowledge-hoarding lead to an environment where open discussion was energized. As a result, internal communities naturally emerged through their K'Netix system. Issues and problems were addressed within these community forums. When an issue or problem went unresolved, a facilitator – they refer to as a "forum specialist" – ensured that item was presented to other community forums for further deliberation. Key here is the managerial intervention that occurred to keep knowledge flowing by ensuring different groups and business units worked together through their knowledge sharing culture and system. This successful effort of promoting knowledge flows have been credited with the company's 250 percent growth in sales in the past decade. Even more important is their sustainment of a competitive advantage in their industry.

Matsushita Electric Industrial. (adapted from Nonaka, 1991; and Wikipedia, 2007) Nonaka offers an example of innovation through knowledge flows. He believes that companies must understand what knowledge is and especially know what to do with it. He points out the success of Japanese competitors like Honda, Canon, Matsushita, NEC, Sharp and KAO explaining their success stems from their ability to respond quickly to customers, create new markets, rapidly create new products, and dominate technologies. Their secret, he believes, is their unique approach to leveraging knowledge. Central to them is making personal knowledge available to others.

Matsushita Electric Industrial (MEI) is one of the world's largest consumer electronics makers. They are better known for their market brands like Panasonic, Quasar, Technics and JVC to name a few. In one example of their community based "learning by interacting" approach, MEI was struggling to develop a new home bread making machine. They could not get the machine to knead the dough correctly. As a result, the crust of the bread was overcooked and the inside was hardly done at all. They exhausted the possibilities within their community of experts. Finally, within their open environment where everyone is a knowledge worker, a software developer, Ikuko

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Tanaka, proposed a creative solution. Her suggestion was to open the problem to an outsider. She proposed inviting the Osaka International Hotel, who had a reputation of making the best bread in Osaka, to help them resolve their problem.

In an arrangement, Tanaka was permitted to train under and observe the hotel's head baker to study and learn his kneading technique. After a time of trial and error, and working closely with the project engineers, Tanaka came up with the product specifications that successfully reproduced the baker's stretching technique and quality of bread. As a result, the unique kneading method they developed into their product set a sales record for new kitchen appliances. This type of innovation is a demonstration of how the community had to open up to new possibilities by enabling the flow of knowledge from outside their community of product developers.

There are many more examples like these previous two case studies that exemplify the essence and benefits of having a knowledge-focused approach to "Knowledge Management" and a Community of Practice. For further study, Saint-Onge and Wallace (2003) provide an excellent detailed account of the birth and evolution of a Community of Practice for insurance agents at Clarica Life Insurance Company. APQC (2001) also provide a thorough evaluation of CoP case studies at DaimlerChrysler, Ford Motor Company, The World Bank, Xerox and others. At this point it is worth clarifying that although this author was unable to find much literature on knowledge-focused CoPs in the military, there are examples. At the time of this writing, from observing various CoPs in the Army and the Air Force, this author found that the few Knowledge-focused CoPs are the exception among a sea of information-focused "communities." One community that has gained much attention as exemplary of the learning by interacting model is the Community of Practice for Army company commanders.

Army Company Commanders. (adapted from Dixon et al., 2005; Snyder, Wenger and Briggs, 2003; Kendall and McHale, 2003; and Baum, 2005)

> Welcome to CompanyCommand, the professional forum by and for us –
> Army Company Commanders. This is OUR forum – it is voluntary,
> grassroots, and is focused like a laser beam on Company Commanders.
> By participating, you are gaining access to an amazing community of

professionals who love Soldiers and are committed to building combat-ready teams. (The "Charter" banner on the CompanyCommand community main page, acquired on August 21, 2007)[24]

Major Nate Allen and Major Tony Burgess started this Community of Practice in March of 2000. Kendall and McHale (2003) documented a discussion with them about the motivation for this community:

> [They] were neighbors and commanded companies in the same Brigade…they observed other commanders and took note of both the good and the bad that they saw. While in command they kept notes and continued to share ideas, usually during the evening when they hung out on their front porch talking about what was going on in their companies. They thought, "Wouldn't it be great if commanders could easily share their ideas with like-minded leaders across the Army? Every Captain that they talked to got excited about finding a way to better share ideas and, to an Officer, everyone had already considered capturing some of their command experience in writing. However there was no easy forum for this to happen and, once out of command, most Captains were off to the next busy assignment with no established system for them to remain tapped into Company Command.

Allen and Burgess realized their conversations were having a positive impact on their units and wanted to pass it along. Using a forum they were familiar with (Alloutdoors.com[25]) as a model, they wanted to create a similar virtual meeting place which allowed for unmediated, real-time cross-chat and debate to replicate their "front porch." With the help of Web-savvy Westpoint classmates and their personal finances, they launched a site on the WorldWideWeb called Companycommand.com without the authorization or support of the Army. As such, it was an affront to protocol, control of information, and the Army way of monitoring and vetting. After two years of fast and natural growth they needed support. At this point, senior leaders at the United States Military Academy stepped up to resource and support the idea. In 2002, the founders officially "gifted" the site and idea to the Army. Ultimately, it was brought behind the

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[24] Access to the company commander Community of Practice is restricted to past, present and future company commanders. It is accessible through Army Knowledge Online or through http://companycommand.army.mil/.

[25] Alloutdoors.com has since emerged as AlloutDoorsForum.com and is a family oriented discussion forum where sportsmen post questions and solicit advice about a variety of outdoor subjects; such as hunting, fishing, family life and politics. This forum is considered a Social Network or Community of Interest (see Table 11).

Army firewall and provided with funding, technological support, and greater structure, but the vision, the ideas and the team remained the same (Allen, Burgess and few other original founders were reassigned to Westpoint to officially continue their work on Companycommand). See Appendix E for screenshots of the CompanyCommand CoP.

Presently, CompanyCommand is a network of past, present and future company commanders who connect in conversation about relevant content to advance their practice. Instead of drawing on the wisdom of "experts," CompanyCommand (CC) provides young officers with knowledge based on the daily struggles, learning and insight of professionals who are or had recently been on the frontlines. Therefore, the CC team subscribe to three principles (Dixon et al., 2005):

- Connecting company commanders to each other gives them access to the knowledge of the profession,

- Connections make conversation possible,

- Content grows out of conversations.

They established roles that they found to be instrumental in making these connections, conversations and content happen across twelve areas, including Training, Warfighting, and Soldiers and Families. Each area is broken into discussion threads on everything from mortar attacks to grief counseling and dishonest sergeants. (Baum, 2005) The roles they use are:

- Members: Company commanders are the CC professional forum. All company commanders – past, present, and future – are members.

- Facilitators: *Topic Leads* take responsibility for particular topic areas to manage and facilitate the discussions. *Command Contacts* are forum members, who have a depth of experience in a particular topic and make themselves available to company commanders. *Pointmen* are members who step up to perform critical tasks or lead projects that are more limited in scope.

- Leadership: *CC Support Team* is a small group, including the founders, who serve the members by interacting with the Army, working technology and design issues, seek resources, and handle the administrative requirements of running the forum.

Companycommand has evolved. Gaining more structure and support since its beginning it has matured into an effective place for professional and practical learning in a nontraditional manner. Baum (2005) wrote on one example:

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Captain Stephanie Gray was a twenty-four-year-old communications officer in Baghdad when, in January of 2004, she was abruptly ordered to serve as her battalion's adjutant, whose job is to manage pay, evaluation reports, and other personnel issues. She'd had minimal training. On Gray's first day on her own, a call came in at nine-thirty informing her that one of her battalion's convoys had been struck by an I.E.D. in Sadr City. The commander, executive officer, and sergeant major – the battalion's entire leadership – jumped up and sped to the site, leaving Gray in the command tent. She got a call saying that Sergeant First Class Ricky Crockett had been killed – the unit's first death. "I knew there were a lot of things an adjutant needs to do when a soldier dies," she told me, "but I had no ideas what." She logged onto Companycommand and clicked feverishly through the site looking for guidance. Finally she clicked "contact us" and explained her situation. "Within thirty minutes, I got my first response, and all day I got e-mails," she said. "Some were from active military and some retired. One was a chaplain. 'Look at this regulation,' they told me, or 'Here's what I tried.' I learned how to report it up, then look in the soldier's file and generate letters from the company commander, the battalion commander, and the brigade commanders to his family…There were death-benefit papers to fill out, and on and on."

This forum places great value on connecting people. The belief is that "in a tightly connected community like CC, members are no more than three degrees of separation from people whose experience and perspective can improve their effectiveness immeasurably." (Dixon et al., 2005) A subtlety in these words underscores their desire to promote effective communication versus efficient communication, which is a distinction between a knowledge-focused approach and the information-focused stream of thought (see Table five). By connecting people, they allow the knowledge of the profession – company commanders throughout the Army – to flow from those who know to those who need to know or from those with specific experience to those who need that experience immediately. In Capt Gray's case, CC was a natural part of her "work-process" in addition to a natural way she learned. Consider that this story demonstrates that the Army's most value asset is the experience of its members. "The more we connect people, spark conversations, create content, and foster a sense of professional community – the more effective we will become." (Dixon et, al., 2005)

In 2005, CompanyCommand's membership grew beyond ten thousand, or more than a third of all captains in the Army. In 2006, the Harvard Business Review named Commandcommand.com as one of twenty of the most breakthrough ideas for 2006. (HBR, 2006)

The point of this section is to highlight the importance of knowledge flows in a Community of Practice where learning is central. The case studies presented here stresses what Nissen (2006) advocates: knowledge flows lie on the critical patch to performance. Therefore, this issue certainly deserves managerial attention and intervention, and should not be forgotten when designing a CoP. Consider those tools previously mentioned, at Figure 10, when seeking to promote the flow of knowledge – "learning by interacting" using storytelling, observation, interaction or discussion for example. As Buckaman Labs, Matsushita Electric Industrial and Companycommand did, the possibilities must be opened toward adding to individual knowledge and improving the overall practice. In summary:

- Learning is central when using a knowledge-focused approach to a CoP

- A community culture that supports the flow of knowledge must be present for learning to occur

- The Community of Practice toolset provides the CoP leadership and facilitators options to promote knowledge flows in the community

E. THE "KNOWLEDGE MANAGEMENT" FRAMEWORK AND A COMMUNITY OF PRACTICE

The "Knowledge Management" framework introduced in Chapter, III Section D provides a good fit for use in developing a Community of Practice. As decomposed in Table eight, it brings together components – personnel, work processes, structure, and technology – for leveraging knowledge in an organization. This author posits that its construction can also be extended for use in a distributed community characterized by the working definition developed in Section A. The case studies reviewed in the previous section demonstrate how these components can be used to achieve strategic objectives in a KM program and CoPs. For example, at Buckman Labs, an enormous effort was made to shape the organizational environment – *Structure* – and utilize *Technology* to connect its associates through community forums. At Matsushita Electric Industrial, *People* are

central and work under an organizational *Structure* that promotes knowledge flows and a natural integration of *Work Processes* that promotes innovation. Companycommand exemplifies the importance of *People* and the roles that act as glue in a Community of Practice. This forum utilizes *Technology* to support and enable the flow of knowledge – connecting people with people – rather than focusing on simply capturing information and documents. Each component plays an integral role in these case studies. Hence, this author believes that this approach provides a framework to remind the CoP architect what to pay attention to in designing a community.

The KM framework is generalizable to accommodate the variety of methods and degrees of Community of Practice implementations. A one-size-fits-all program does not exist. A program manager must consider these organizational elements – personnel, work processes, structure, and technology – when designing a program as a starting point. Therefore, this section will add to the previous discussion in Chapter III, Section D, to address the implication of this framework on a CoP.

People. As with any knowledge management program, people represent the central element of the system. A CoP is primarily concerned with the flow of knowledge between people in a networked community. Since knowledge is resident in people by way of experiences, intuition, training, education, values and social interactions they are the first consideration in a CoP design. They also function in vital roles such as sponsors, leaders, subject matter experts, content editors, facilitators, and community members. (Garcia and Wallace, 2005).

Processes. A well designed CoP attempts to support the natural ways people work. Wenger et. al. point out that organizations need to cultivate "communities of practice actively and systematically, for their benefit as well as the benefit of the members and communities themselves." (Wenger et. al. 2002, p. 12). They should be a natural part of organizational life. A knowledge manager should ensure that work processes are well fitted into the design of the CoP.

Structure. A CoP can take on a formal or informal structure. Garcia et. al. argue that an organization should apply a systematic hands-on approach to building a CoP. Key roles should be appointed and leadership should carefully think through the

important aspects using deliberate planning. (Garcia et. al. 2005, p. 23) Wenger, McDermott and Snyder (2002), on the other hand, believe that CoPs should develop on their own with minimal intervention. They think it is best when members and leadership emerge on their own, therefore CoPs should not be over-managed. Where both agree is the point that the organization has an important role in cultivating the environment of the CoP, formally or informally. Again, there is no one-size-fits-all design. Organizations would stand to benefit from a formally or informally structured CoP, so long it is tailor made.

Technology. A typical mistake is to design a KM program around a technology implementation. For CoPs, it is not enough to just launch a web portal with a host of applications hoping people will use it. Technology is important for a CoP, but in a supportive role. Recall "Information technology plays supportive roles in organization work routines…" (Nissen, 2006). There is an abundance of literature that adds support to this. Among many, Wenger (2001) has learned that "Experience has shown over and over that what makes for a successful community of practice has to do primarily with social, cultural, and organizational issues, and secondarily only with technological features." Rollett (2003) also believes that "While technology should not be the primary concern of knowledge management projects, it does have an important role to play as an enabler and catalyst." Therefore, although technology can never be a knowledge management program by itself it certainly has an important role in one. Technology has actually enabled CoPs to flourish due to their capability to support knowledge flow across an extension of time and space; same time/same place, same time/different place, different time/same place, and different time/different place. Therefore, when used properly, IT can provide a substantial boost in work flow and knowledge flow. This research is not intended to fully explore the technology applications and leaves it for further research. However, at Appendix F, a brief survey is provided of extant applications that are useful for CoPs.

F.   DESIGN CONSIDERATIONS

This chapter expands our understanding of "managing" and leveraging knowledge through Communities of Practice. The previous sections presented those key

considerations this author found to be the most critical toward gaining an appreciation of the knowledge-focused approach to KM for a CoP. As such, they present thoughts that can be generalizable to a variety of situations in the private sector, in government or in the military. Missing so far are specific considerations that may be useful toward a more targeted approach. Therefore, this section offers various recommendations from a variety of academics, practitioners and writers that serve to further our understanding.

Indeed, a CoP is a KM approach for leveraging knowledge and promoting its flow. Moreover, there are several "tangible" aspects that are easily understood toward operationailizing a CoP design. Table 14 introduces several key practical functions of a CoP, such as *communication, collaboration* and *workspaces*. Note that these practical functions can be observed in a community with or without the support of technology. Consider that these same functions were present to some degree in the workplace before the emergence of the computer and a "Network Economy." The point here is that these are principally human activities with deep social implications. However, it is clear that these practical functions have benefited from information technology. Presently, technology plays an essential, natural, expected and inseparable role in the workplace. Therefore, these functions need to be addressed with thought on how technology can enable and improve them.

Practical Functions of a Community of Practice

- Enhances **Communication** between community members, and within and across organizations;

- Facilitates **Collaboration** between community members;

- Provides a place for **Content Creation and Management**;

- Supports **Learning** by providing opportunities for member interaction;

- Provides for **Personal Workspaces** and places to meet in **Shared Workspaces**;

- Offers structure for **Social Networking**;

Table 14.   Practical Functions of a Community of Practice

Communication.   Communication is a process by which people exchange data, information and energize the flow of knowledge.   These three elements flow when communication is made.   Harnessing the flow of these three elements constitute a beginning for a knowledge management program and the medium by which CoP members are able to interact.   Once harnessed, communication between people is made possible and efficacious.   Effective communication supports the creation, sharing and refinement of knowledge. This introduces the first supportive role technology has in a KM program.   "Without communication, there could be no knowledge management." (Rollett 2003)   Technology in its role as an enabler of communication supports the sharing of knowledge.   In a CoP context, technology can be best described as an enabler of synchronous and asynchronous communication.   For a community of knowledge workers communication between people and organizations is vital if not the most important function of all.   Synchronous communication allows information and knowledge to flow when participants engage in it at the same time.   In asynchronous communication, information and knowledge flow when participants are separated by time.   The relevance of this is explained by Rollett (2003):

> …the role of technology has been that it is important as an enabler and communication technologies are a very good illustration for that. They are obviously not an end in themselves, but they play an essential role in enabling people to communicate and share knowledge in situations in which they could not do so without technology support.

Collaboration.   Collaboration is the process of people working together. In the context of a CoP, collaboration infers a process where participants work together to share what they know.   This can occur in a structured and unstructured form.   Both types are important.   Knowledge managers implementing a collaborative technology solution should seek to find a balance between them.   A structured collaborative technology format promotes supervised knowledge flow in the aggregate to encourage faithfulness to a guiding strategy.   It is useful to encapsulate the unstructured form of communication with predefined bounds. A careful knowledge manager is sensitive to the balance needed to allow freedom of informal collaboration within a bounded structured format.   The unstructured format promotes the free flow of interactions and knowledge.   The

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implication is that effective collaboration supports the creation, sharing, application and refinement of knowledge. Therefore, technology can effectively support collaboration if it is planned based on how it will be used by people. (Nissen, 2006).

Content Creation and Management. Content creation and management are activities essential for the knowledge worker to be able to illuminate information efficiently for effectual reuse toward supporting learning. Recall that information flows, although not central to "Knowledge Management," do play an essential role in flows of knowledge (refer to Chapter II, Section B). Additionally, information exchange is part and parcel to all asynchronous forms of communication; such as email, discussion threads and chat. CoPs, through the use of technology, are able to create information by instantiating explicit knowledge – from those who know – for reuse by members who are separated by the extension of time and space (when they are not in the same time and place). Technology takes on this role by providing authoring tools to create, annotate and enrich instantiated knowledge – information. It also supports the management of this information. As knowledge can be lost and found, (Nissen, 2006) and is scarce, information in contrast can become a burden and overwhelming if not controlled and managed. The point with this is that community content in the form of information, documents and data is like a two edge sword. Clearly, it supports learning, but as McDermott (2001) warns, they can lead to "information junkyards." Therefore, it is important that the community design and culture be tuned more toward a "learning-by-interacting" based experience rather than a "library" type experience. As Wenger, McDermott and Snyder (2002) suggested, a good community design should seek "aliveness" – active, meaningful and effective interaction between its members.

Learning. Much has already been discussed about this. Needless to say, learning that leads to action is the fulfillment the CoP purpose. A CoP supports learning by providing the participant the opportunity to interact, develop new knowledge and refine existing knowledge. Additionally, technology, like a discussion forum, used in a CoP serves as a virtual classroom where participants are able to develop knowledge through their participation at any time and from any place. The most attractive contribution of technology to learning is classroom availability. It enables learning in situations in which it would otherwise not be possible at all since it can be deployed to anyone in any

technology enabled setting. Technology brings the classroom to the people. The relevance of this is that when learning is taking place knowledge is flowing since "learning both uses and increases knowledge." (Nissen, 2006). The implication is that effective learning takes place in a CoP when knowledge is made available to all members – as with Nonaka's "knowledge creating company."

Personal and Shared Workspace. "Knowledge management" is primarily about people and a CoP is a collaborative group of like-minded people focused on promoting learning, managing knowledge flows and nurturing new members. These people have needs that require support. Technology can fill this gap with personal and shared workspaces where individual and group needs are addressed through accommodation of styles and working habits. IT takes on this role by offering a CoP an inviting user interface that can be customized and personalized to support the individual's and group's performative role in the workplace and the learning style in a community. A workspace should be designed to be useful and easy to navigate. The relevance of this is explained by Rollett (2003):

> A requirement particular to knowledge management systems is that they should support informal, natural ways of sharing knowledge with other people. Apart from making the system easier to use, this will also help with gaining acceptance among employees.

Social Networking. People networks are important in a CoP. Connectivity provided by technology supports knowledge flows and the social interactions between members. Without a reliable physical network infrastructure a distributed CoP will be largely ineffective and will die due to lack of knowledge flow nourishment. In a network economy, connectivity within and to the outside of an organization is vital. Similarly, for a CoP, connectivity provided by IT supports knowledge flow and the social interactions between members. In a distributed CoP, socialization and collaboration are indicators of a healthy flow of knowledge and "aliveness." Socialization at the individual, group and organizational levels represent the sharing of knowledge. The implication here is that effective social networking promotes creation, sharing, and refinement of knowledge. IT provides the means to interconnect these segments enabling "healthy knowledge-flow circulation." (Nissen, 2006).

As previously mentioned, a one-size-fits-all CoP does not exist. A design must be tailor made and fitting for each community to consider their people, environment and practice. To begin, a knowledge manager must first consider the elements of a KM program – *personnel, work processes, structure* and *technology* – when designing a CoP. Once these considerations are taken into account a solid foundation is in place where a CoP can be built upon. This initial step is relevant for any type of KM program. Although it will lay a very important foundation for a CoP to be built upon, it may not be sufficient for practical purposes. A knowledge manager may need supplementary guidance specifically ideal for a CoP implementation. There are several notable practitioners that offer specific advice (Wenger, McDermott, and Snyder, 2002; Garcia and Dorohovich, 2005; or Saint-Onge and Wallace, 2003). For the purpose of this research, only the advice offered by Wenger, McDermott, and Snyder in "Cultivating Communities of Practice" will be examined to offer the reader a glimps of some specific practical advice on how to implement a CoP. The other writers offer similar recommendations that are useful, but the work that is used here was chosen due to its wide acceptance as the seminal document on Communities of Practice.

Recall from Section B that a Community of Practice is primarily a social undertaking. Snyder, Wenger and Briggs (2004) further this idea by adding that a community's effectiveness depends on the strength of three dimensions of its social structure: its domain, community, and practice. Table 15 summarizes these dimensions. When they function together they provide the CoP a knowledge-friendly social structure that is able to take responsibility for knowledge flow.

Dimensions of a Community of Practice

- **Domain** refers to its focal issues and the sense of members;

- **Community** includes its member relationships and the nature of their interactions – levels of trust, belonging, and reciprocity;

- **Practice** consists of a repertoire of tools, methods, and skills – as well as members' learning and innovation activities;

Table 15. Dimensions of a Community of Practice (After: Snyder, Wenger and Briggs, 2004)

These dimensions represent the social aspect of the community that is distinct from the formal organizational structure. It also provides a means to understand the ways in which members participate in a CoP. For instance, some members may be more interested in community then the practice. While others may be peripheral members who only care to observe discussions on issues – the domain. This provides the knowledge manager considerations to help focus development efforts of the social aspects of the community. The importance of this emerges in the following practical steps Wenger, McDermott and Snyder (2002) offer toward implementing a CoP. The overall goal of this approach is to promote community development around each of the three dimensions. Hence, this is not to offer a recipe for success, but to offer a design that allows for flexibility and improvisation.

Their approach, they believe, aims at drawing out the direction, character and energy from within the community – to achieve "aliveness" across the social dimensions just mentioned. Figure 12 summarizes this by characterizing the development of a community as passing through stages over time. They explain:

> Like other living things, communities are not born in their final state, but go through a natural cycle of birth, growth, and death. Many go through such radical transformations that the reasons they stay together have little relation to the reasons they started in the first place. (Wenger, McDermott, and Snyder, 2002)

The stages they say a community passes through are: potential, coalescing, maturing, stewardship, and transformation. Referencing Figure 12, across the time dimension, the community is expected to manifest different levels of energy and visibility that coincide with the stage. For instance, a new community initially draws interest from those who have a vision and desire to launch it. Once it is launched, immediate value typically seen and the energy and visibility level spikes, but subsides to a more balanced trajectory quickly. If cultivated, it can further mature and enter the stewardship stage where it may endure or eventually transform or die off over time. They point out that the community's development is rarely smooth and frequently involves "painful discoveries, difficult transitions, and learning through hard-won experience." Saint-Onge and Wallace (2003) agree and use this model in their work. Nicklos (2003) offers something with similar stages: committing, starting-up, operating, winding down and shutting down.

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These types of development models (some refer to them as maturity models) are helpful, but should not be taken literally since it is reasonable to expect every community experience to be different.

The jagged line represents the level of energy and visibility that the community typically generates over time
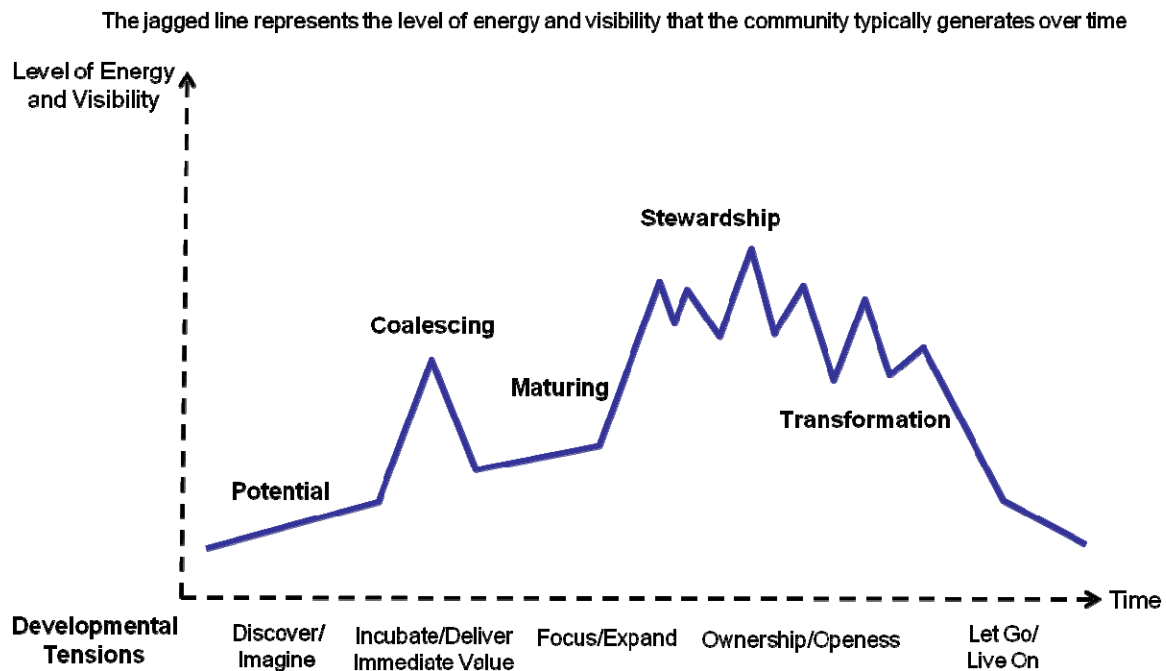
Figure 12.   Stages of community development (After: Wenger, McDermott and Snyder, 2002)

- **Stage 1: Potential.** Here a community or group of people realize or try to find enough common ground for them to feel connected and see the value of sharing insights, stories, and techniques.   The energy and visibility grows when the potential community discover that other people face similar problems, share a passion for the same topics, have data, tools and approaches they can contribute, and have valuable insights where they can learn from each other.   Passion drives this stage, but value should be sought across the dimensions of a CoP – *domain, community* and *practice*. The scope of the *domain* – issues – needs to be defined. The *community* needs to be identified. And, the common knowledge needs of the *practice* need to be specified. Toward this, the following considerations should be made:
    - Discover and Imagine. Discover who talks to whom about topics, what issues they discuss, the strength of their relationships, and the obstacles that impede the flow of knowledge and collaboration. Imagine how the community can be more than just a social network by seeing the possibilities.

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- Determine the Primary Intent of the Community. Focus on one purpose to adapt people, structure, process and technology most suited for that intent. For example: a helping community, a best-practice community, a knowledge-stewarding community, or an innovation community.

- Define the Domain and Identify Engaging Issues. Without determining the shape of the community, define the domain in a way that will engage potential members. Focus on what is important to the practice, what members will be passionate about and define it wide enough to bring in new members and ideas.

- Build a Case for Action (a value proposition). Describe the potential value to the organization (to those who will fill the roles of *leaders* or *support*). Market the value of participation to potential members.

- Identify Potential Coordinators and Thought Leaders. The most important factor in success is the vitality of the *leader* and the *facilitator*. The coordinator – the *facilitator* – should be well respected. The thought leaders are members who are regarded as being on the cutting-edge on the issues of the domain.

- Interview Potential Members. Interview potential members to discover the issues and opportunities to leverage knowledge.

- Connect Community Members. Use member interviews to begin connecting and linking members. This helps show the potential value the community may provide the members before they join.

- Create a Preliminary Design for the Community. Create ideas and models of how the community might work. Include a description of the scope and topics, people (key members and roles) structure, processes, and supportive technology. It should be detailed enough to initiate activity, but not restrictive to improvisation and new ideas.

- **Stage 2: Coalescing.** Once there is a vision of where to go and an understanding of what already exists, the community can be launched. Here activities begin that allow members to build relationships, trust, and an awareness of their common interests and needs. For the *domain*, the value of sharing knowledge about the domain should be established. For the *community*, relationships and trust are sought. For the *practice*, discover what needs to be shared and how. Toward this, the following considerations should be made:

    - Incubate and Deliver Immediate Value. Balance the need to establish relationships and trust between members against the need to demonstrate value of the community. Nurture the community to where members develop the habit of using the community to help

each other in order to deepen relationships. Deep understanding of the practice should be sought.

- Build a Case for Membership (value proposition). Build a case for membership to invite new people and strengthen the relationships between existing members. Market the benefits of contributing and the value of learning from other's experience.

- Launch the Community. Start with a visible or invisible launch. A visible launch draws more energy, visibility and participation in the outset. An invisible launch, gives the community time to bond, discover, develop and share on their natural rhythm.

- Initiate Community Events and Spaces. Regular events help to anchor communities, establish a sense of familiarity and create rhythm. They should be frequent enough to become familiar and routine, while respecting the time of members.

- Legitimize Community Coordinators. Most of the work coordinators do is invisible to members and the organization. Therefore, recognize and reward coordinators early in the community's life.

- Build Connections Between Core Group Members. During this coalescing stage it is more important to develop a core group than building membership. Through the core group the community more easily discovers value and strengthens the fabric of the community.

- Find the Ideas, Insights, and Practices that are Worth Sharing. Members should begin helping each other solve everyday problems that fall within their domain. From this emerges value, trust, curiosity, and other possibilities.

- Document Judiciously. Heavy documentation requirements become a burden to members and adds another task to their work schedule. Focus on interactions relating to current high-energy issues. If documentation is needed, appoint and support members to accomplish this as an upfront task.

- Identify Opportunities to Provide Value. Capturing value is critical. To generate value, link those with problems with those with solutions, focus meetings on topics relevant to daily work, create links to outside experts, and develop material that members need. Collect anecdotes that illustrate the value of the community for members of the organization.

- Engage Managers. Managers and supervisors should understand the value of the community and support it. Managers should legitimize the community by encouraging its use and sending issues to it.

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- **Stage 3: Maturing.** Here, instead of establishing value, the main issue is clarifying the community's focus, role, and boundaries. Develop a comprehensive body of knowledge and expand the demands on the members, both in time and in the scope of their interests. For *domain*, further define its role in the organization and its relationship with other domains. For *community*, manage its boundaries so that it does not become distracted from its purpose. For *practice*, seek gaps in the community's knowledge and identify what is cutting-edge. Toward this, the following considerations should be made:

  - **Focus and Expand.** Balance the need to focus on interests and topics that energize the core group with expansion to other possibilities to accommodate new members. Resolve this by learning how to preserve relationships, excitement and trust as the community expands membership.

  - **Identify Gaps in Knowledge and Develop a Learning Agenda.** Refine the *domain*. It, rather than individual needs, should now become the primary driver of events. Identifying gaps in knowledge is healthy and useful toward exploring new topic areas, creating guidelines, or identifying different approaches to the practice.

  - **Define the Communities Role in the Organization.** As the community matures it assumes a more important role in the organization. The organization may attempt to push issues or tasks the community does not care to accept. Therefore, be clear about the responsibilities the community can assume. A community must maintain its autonomy and not become another taskable subunit of the organization. However, communities act more collectively as they mature gaining them more influence in the organization.

  - **Redefine Community Boundaries.** Growth results in a need to restructure the community. Subdividing the community into topical sub-communities is useful so that people can stay connected to the whole community while maintaining a strong tie to a smaller group.

  - **Routinize Entry Requirements and Processes.** A well defined entry process can alleviate problems. Establish expectations for new members, such as requiring them to understand the community's purpose, history, scope of activities, and norms of interactions. Sponsorship of new members may be need.

  - **Measure the Value of the Community.** By this time there should be enough evidence to make a convincing case for its existence. More traditional and clear demonstrations of value should be collected.

- **Maintain a Cutting Edge Focus.** The focus should be watched and managed. Encourage cutting-edge thinking by discouraging "competency-traps" and "group-think." Innovators, new members and outsider's provide added insight to possibilities.

- **Build and Organize a Knowledge Repository.** Information can become a junkyard of disorganized documents. Organizing and maintaining order of a repository is a crucial objective. Taxonomies and community librarians are useful tools to manage information.

- **Stage 4: Stewardship.** Maintaining freshness and liveliness of the community takes energy and attention. Declining energy can become a vicious cycle. Therefore, sustaining community momentum through natural shifts in its practice, members, technology and relationships is important. For *domain*, during this stage, its relevance must be maintained. For *community*, the tone and intellectual focus must be kept lively and engaging. For *practice*, the goal is to keep the community on the cutting-edge.

  - **Ownership and Openness.** Communities build a sense of ownership of their domain as they build it. However it needs to ensure that ownership does not squeeze out openness. Therefore, a community must continually and actively solicit new ideas, invite new members and seek new leaders to bring fresh vitality to the community.

  - **Institutionalizing the Voice of the Community.** Once the community has attained a capacity of reliable stewardship, they can become critical to the organization's long-term success as keepers of the organization's core competencies. When this occurs they often need a liaison or process for influencing the organization.

  - **Rejuvenate the Community.** Communities naturally go through periods of high and low energy. Therefore, it is important to rejuvenate by introducing new topics, controversial speakers or meetings with other communities or groups that draw on the community's knowledge.

  - **Hold a Renewal Workshop.** Use renewal workshops to reaffirm the commitment to the community and set new directions.

  - **Actively Recruit New People to the Core Group.** Due to turnover of core members, continually watch for members who can replace them. Look for people who are midcareer, or are involved in emerging topic areas and who would appreciate an opportunity to take a more active role in the development of the practice.

- **Develop New Leadership.** Leadership also experiences turnover. Therefore, keep a watch for successors. Sometimes when community energy wanes significantly, replacing the leadership is helpful. Consider regularly rotating leadership.

- **Mentor New Members.** Communities of Practice provide a good place for mentorship programs organizations are not able to accomplish. Mentoring new members helps keep the community on the cutting-edge by providing an outlet for newcomer's questions.

- **Seek Relationships and Benchmarks Outside the Organization.** Different organizations and outsiders bring different perspectives, and often new ideas, to the practice. Therefore, input from outside the organization is one of the most effective ways to refresh a community's focus. Mature communities often form ongoing relationships with other organizations to compare and refine practice or develop new ones.

- **Stage 5: Transformation.** Transformation is a natural part of a community's life-cycle. They can transform into something different or die off. The *domain* can be rendered irrelevant due to changes in the environment. The issues that spawned the community can get resolved. The practice can also become so commonplace that community is no longer needed. And, members may simply lose interest. For any of these reasons the community may transform or fade away. In some cases the community may get institutionalized into the organization. The point here is that one should expect a Community of Practice to endure so long it is needed. However, also be aware that many communities also die before their time when their importance is not recognized.

These recommendations serve to provide the practical edge to the concepts previously discussed in earlier sections and previous chapters. It also represents the culmination of what is developed in Chapter II (understanding knowledge), Chapter III (understanding KM), and this chapter on understanding what it a Community of Practice.

Using the KM framework, the seven principles for cultivating a community and the stages in community development as a guide to build a CoP, the knowledge manager is equipped to undertake the development of a knowledge-focused community. This approach emphasizes evolution of a community over fabrication of a community. It also aims at energizing participation as a catalyst for community growth, development and learning. Finally, it centers attention on knowledge and its flow to achieve learning for organizational performance. Indeed, a Community of Practice is not only a viable option in a KM program but serves as an effective means of managing the flow of knowledge

when the extension of time and place is an issue. The next chapter uses what is learned in these previous three chapters to develop a blueprint for use for two current functions in the military: the Air Force Manpower function and the Navy Security Cooperation function.

In summary of this chapter:

- A Community of Practice is an approach to "Knowledge Management"

- Communities of Practice are social entities

- Communities of Practice need to be cultivated and supported

- Communities of Practice are sustained by the flow of knowledge

- The KM framework using *People, Work Processes, Structure* and *Technology* can be extended for use to lay a foundation for building a distributed Community of Practice upon

- The "Stages of Community Development" can be used as a practical guide for implementing a Community of Practice

V.   DESIGNING A KNOWLEDGE-FOCUSED COMMUNITY OF PRACTICE

The military stands to benefit from a knowledge-focused approach to "Knowledge Management."   Recall from Chapter III, Section E, *Knowledge Management in the Department of Defense and the Air Force*, this author found that an information-focused approach to "Knowledge Management" prevails in the military. The dramatic growth of CoPs in the military (5,000 member growth per month in the AF) serves as evidence that information-focused Communities of Practices – where technology and document archives are central – have found a valued place in military activities. However, drawing from what is learned in Chapter IV, a Community of Practice which focuses on leveraging knowledge over information opens up possibilities that cannot be addressed with the former approach.

From a review of Air Force Manpower and Personnel CoPs (reference Appendix G), this author observed the common modus operandi for them was almost entirely document sharing. Adkins (2007) explains why CoPs in the AF tend to take this path: "…it [an Air Force Knowledge Now (AFKN) CoP] provides persistent, user controlled, ability to record interactions and the outputs of those interactions with access, world-wide 24/7." Indeed, this is attractive for many AF units who recently, in 2006, were directed to migrate unit web sites to a standardized, controlled and restrictive AF Portal (see Appendix B). As a result, many units decided to create an AFKN enabled CoP in-lieu of using the AF Portal since an AFKN CoP provided a flexible and easier means to share documents and information that were previously posted on their unit web sites.   To introduce a possibility to this main stream trend, this research intends to draw attention to the knowledge-focused approach because missing in the former method is consideration for intrinsic and fundamental issues about knowledge that could improve the effectiveness of these and other CoPs for providing greater value to its members; for example, there is a lack of attention given to knowledge as a uniquely human feature or person to person interactions. As a consequence, knowledge flows – such as learning from interacting – between people are marginalized or ignored. Therefore, it is worth

exploring how those concepts discussed in previous chapters can be operationalized in the context of two military activities that are seeking to leverage their community know-how.

This chapter uses several key concepts discussed in the previous three chapters – knowledge, knowledge management and communities of practice – to explore possibilities for extending what is learned in the context of these two military communities:

- The Air Force Manpower function, and
- Navy Security Cooperation activities

Both were selected for this research because their characteristics – distributed community, time and place are an issue, member interaction is sought, and information and knowledge sharing is desired – fit well within the boundaries of what could be addressed by a Community of Practice. Therefore, they are used in this research to help better understand what is learned in the previous chapters. To this end, this fifth chapter draws from several principles previously discussed to further the development of a CoP design that is fitting for these two communities.

Regarding knowledge:

- knowledge is unique and is not data or information
- knowledge resides in the human mind
- knowledge exists in a tacit or explicit state
- knowledge is perishable
- knowledge must flow across place and time to be useful

Regarding leveraging knowledge:

- People are central; knowledge resides and flows between people
- Structure in the organization or community can make knowledge accessible and useful
- A "Knowledge Management" program should support the natural way people work
- Technology plays a supportive role
- Regarding Communities of Practice:

- Communities of Practice are social entities

- Communities of Practice need to be cultivated and supported

What follows are summary evaluations that provide an overview of how the knowledge-focused approach can be used. It is not meant to be a step-by-step practical blueprint for implementing a CoP for these two communities. Further study and effort is required to complete a specific tailor-made CoP implementation. For that, each Service has start-up procedures available to assist in the initial steps for launching a CoP. For example, in the Air Force, the Center for Excellence in Knowledge Management (AFMC/A8C) offers an advisory service to specifically walk organizations through the start-up and additionally provide a funded technology solution. Therefore, the intent here is to provide these two functions with considerations toward directing a new community toward a vision that is based on those principles discussed in this research for long term sustainment and growth.

For these two evaluations, this author conducted a series of qualitative interviews between September 10 through 16, 2007. Their purpose was for discovering what members of these two communities feel and think about their worlds in relation to the issues discussed in this research. These interviews serve two purposes: to draw a sampling of what members think about their practice and the possibilities for a CoP; and to formulate a general assessment if a knowledge-focused CoP is appropriate for these two communities. Ten members of the Air Force Manpower community were interviewed from a variety of organizational units (four from HQ and six from field operations). These ten were also members of an active Air Force Knowledge Now enabled CoP. Additionally, eight members of the Navy Security Cooperation community were interviewed from a variety of organizational units (Office of Naval Research and liaison offices, Offices of Defense Cooperation, Office of Chief of Naval Operations, and Defense Security Cooperation Agency).

A. THE AIR FORCE MANPOWER FUNCTION

The Manpower[26] function is a deep-seated mission support profession for determining and improving the essential quality, quantity and meaning of human assets and organizational structure needed for the Air Force mission. It is a competency of the parent Manpower and Personnel function[27], and identifiable by a core set of unique and experience based (learning-by-doing) activities. The vision for the greater career field is provided by the AF Deputy Chief of Staff for Manpower and Personnel: "Right People, Right Place, Right Time – America's Airmen Creating the World's Best Air Force." Contributing to this vision, the specific strategic goal for the Manpower function is to:

> DEFINE the Force: Accurately defined and programmed manpower requirements and optimally designed organizations, resulting from disciplined manpower methodologies and an integrated Planning, Programming, Budgeting and Execution (PPBE) process. (AF, 2007)

Towards this, officers, enlisted and civilian members perform the core set of activities that are largely non-routine work where inputs can be ambiguous and non-linear, problems are unstructured and semi-structured and work-flow has unclear beginnings and variable ends. The inputs originate from Manpower practitioners with know-how, supported by an information database (Manpower Programming and Execution System) and a universal AF common operating environment (internet, e-mail, Microsoft Office suite, etc.).

Members perform, to varying degrees, the following core activities illustrated in Figure 13, which will be referred to as the "domain of practice" for this community. This represents a summary of those segments of this profession that naturally breakout as constituencies within the community and are typically observed in the construction of formal organizations and other informal relationships (e.g. collaborative groups or social networks). For example, a formal "requirements determination" section is typically part of the organizational construct of most AF units performing the Manpower function.

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[26] "Manpower" in the Air Force refers to the positions –"billets' – that are authorized within DoD end-strength ceilings and funded by Congressional appropriations. It does not refer to people, which are assigned to these manpower positions.

[27] At the time of this writing the Manpower and Personnel profession was being merged with the Services profession. This merger adds additional functions (Nonappropriated fund activates, bowling, and mortuary affairs among others) to this new expanded profession. This change was not included in this work since it was still a pending action.

Members of this Manpower constituency – requirements determination – work internally and externally (horizontally and vertically) with others performing the same core activity in other organizations.
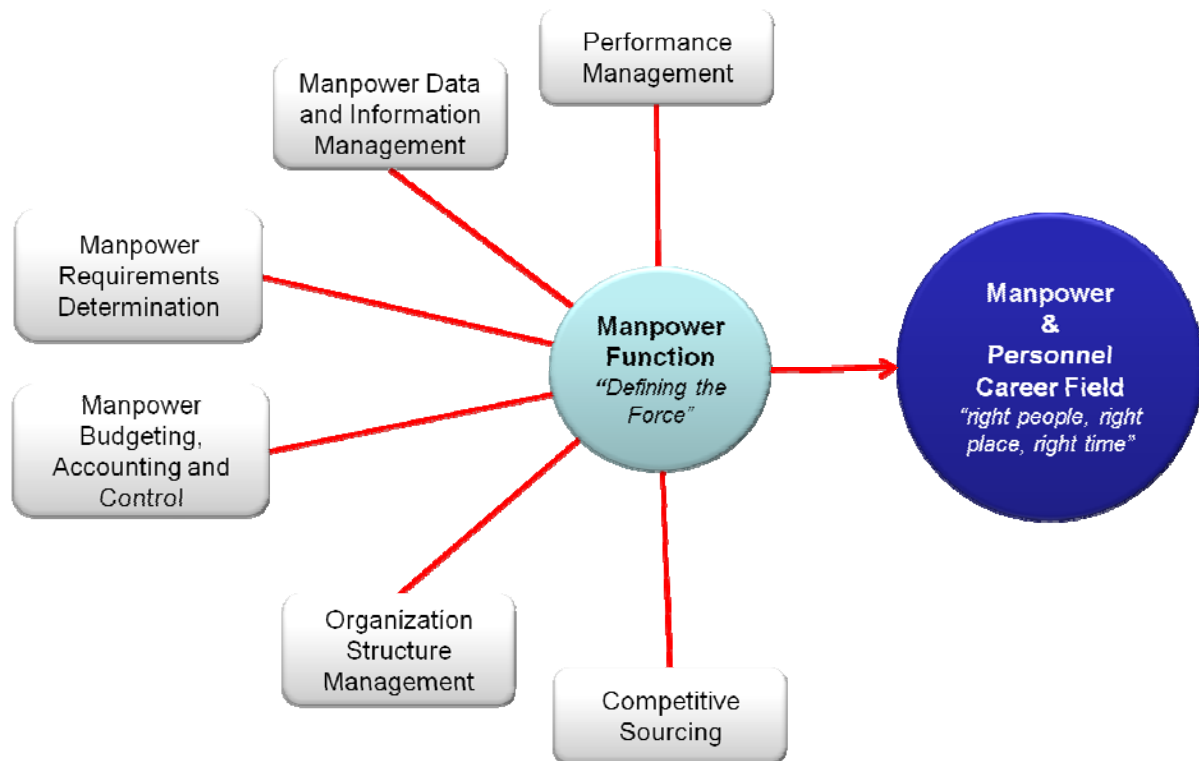
Figure 13.   Manpower function domain of practice[28]

Decomposing Figure 13:

- **Manpower Requirements Determination.** Includes the development of manning standards (management engineering), wartime requirements determination, logistics composite modeling, civilian and military grade classification, and reengineering

- **Manpower Budgeting, Accounting and Control.** Plan, Programming Budgeting and Execution (PPBE) process, regulatory and statutory compliance, reductions in force, and disbursement and accounting of manpower funding

- **Organizational Structure Management.** Architectural design of AF organizational structures and standards, activation, inactivation and redesignation of units, and reorganization efforts

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[28] Traditionally, the Manpower competencies are defined only as: Requirements Determination, Program Allocation & Control, Organization Structure and Performance Management. Here, the author chose to decompose this further into natural constituencies that reflect common social networks in the function, which is more useful for this evaluation.

- **Performance Management.** Performance analysis and reporting, productivity program, suggestion program, organization and performance awards, AF surveys

- **Competitive Sourcing.** Outsourcing (A76), privatization, Most Efficient Organization (MEO) development, and recompetitions.

- **Manpower Data and Information Management.** Administration and operation of the Manpower Programming and Execution System (MPES), Manpower data definition and management, and other Manpower information systems and tools.

1. A Case for a Manpower Community of Practice

Several static factors that define the Manpower function workforce play against it and build a case for the need to find new ways to leverage community knowledge. The workforce is designed to limit the escalation of knowledge stock. The workforce is also distributed across time and space making it difficult for knowledge to flow. The workforce is also highly reliant on experience and interaction based learning for performance. This section addresses these points for establishing the ground for the need for a knowledge-focused Community of Practice for the Manpower function.

The Manpower workforce is designed to limit the accumulation of know-how. For officers, the Manpower function is one facet of their primary Manpower and Personnel career field (AF specialty designation 37F). As a result, the intent for them is to gain broad and shallow experience in these Manpower core activities and other 37F competencies while concentrating on leadership development for the benefit of the parent career field. Additionally, 50% of Manpower civilians are hired into leadership positions with the broad 37F designation. In contrast, enlisted and the other 50% of civilians members have Manpower as their specific career field (AF specialty designation 3S3). They tend to specialize in one or two of the core Manpower activities (i.e. requirements determination and organization structure management), which provides them the opportunity to gain a deeper knowledge of specific areas of the Manpower profession. As a result, they generally lack experience and knowledge in some areas they never work in. Also consider that enlisted members are gained to the 3S3 career field as cross-trainees from other career fields. This means that new enlisted members tend to be seasoned military professionals but lack specific Manpower experience. The point here

is that the Manpower workforce is not designed to have a uniform consistency of Manpower know-how (knowledge) in all its members. Referencing Figure 14, at best, half of the workforce can be expected to have a deep understanding, while the other half a more shallow understanding. Adding attrition (separations and retirements) and the inexperience of new members it is reasonable to infer that less than half of the workforce can be expected to have a deep level of know-how of the Manpower function. Even so, those that have a deep level of know-how are generally experts in one or two of the Manpower activities. This is a consequence of workforce design. The implications of this emerge when work-center managers are confronted with the dilemma of finding the right balance between exploitation and exploration, as discussed previously in Chapter III, Section B. A workforce with a high degree of shallow know-how inevitably works harder to fill the gap in competence. The intent here is not to be critical of design decisions, for there are good reasons for them. The intent is to point to KM as a potential balancing force to counteract the negative effect of the workforce design. Therefore, this introduces the starting ground for the case for a knowledge-focused Manpower CoP to bridge the gap with knowledge shortfalls that members may experience as a result of the design of this workforce.
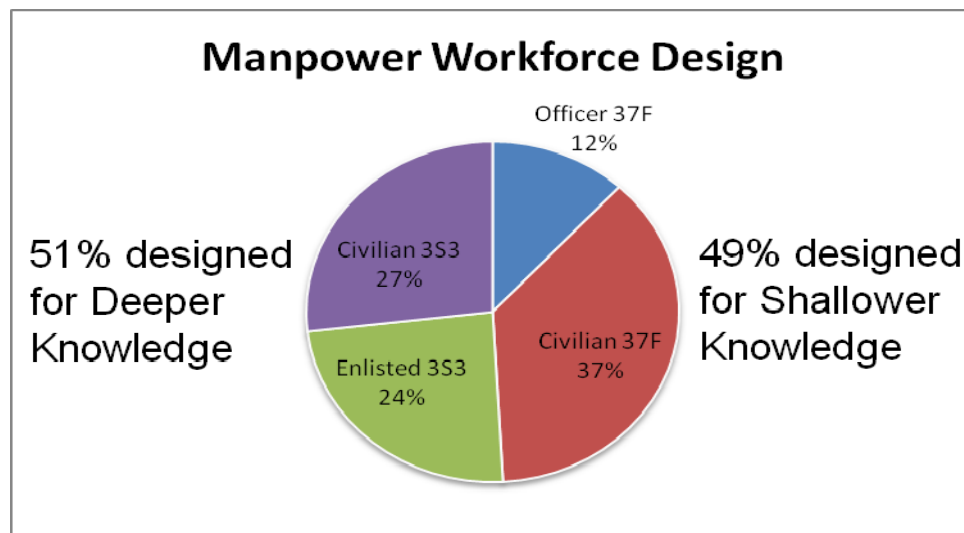
Figure 14.   Manpower Workforce Design[29]

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[29] Data is derived from the Manpower Programming and Execution System acquired on November 28, 2006. Information reflects manpower authorizations for fiscal year 2007 of all 3S3s and 37Fs in FAC 1080, 108A, 1081, or in Manpower function office symbols.

The Manpower workforce is distributed across space and time, which acts as a barrier to the flow of knowledge across the community. Turning now to Figure 15, the Manpower function is performed at all levels of the Air Force organizational hierarchy (i.e. headquarters and field units). Manpower practitioners are assigned to over 2,100 positions distributed across 365 locations (organizational units) around the world. This represents personnel who perform this function full-time. It is also worth noting that an unknown number of personnel also perform the Manpower function as an additional duty in field units throughout the Air Force. For example, Manpower practitioners are normally centrally pooled in a "Manpower and Organization Flight (MOF)" under a "Mission Support Squadron" at each Air Force installation. In many instances, squadrons without assigned Manpower specialists, task a staff member from another specialty to manage the unit's manpower documents and act as a liaison to interact with the installation's Manpower experts. In these cases, the part-time Manpower practitioners normally lack the know-how to perform specific Manpower tasks and rely on just-in-time training, on-the-job training or assistance from the MOF. The point here is that the Manpower function is performed by personnel with a diversity of Manpower experience – "Manpower know-how." Full-time and part-time practitioners make up this distributed community of knowledge-workers. Additionally, this function is distributed globally making time and place a significant issue when interacting horizontally and across the community. Therefore, consider the challenges present in leveraging Manpower knowledge toward sustaining, improving and promoting innovation within this practice. This adds additional ground for the case for a knowledge-focused Manpower CoP that promotes interaction and learning across the distribution of experience, people, places and time.
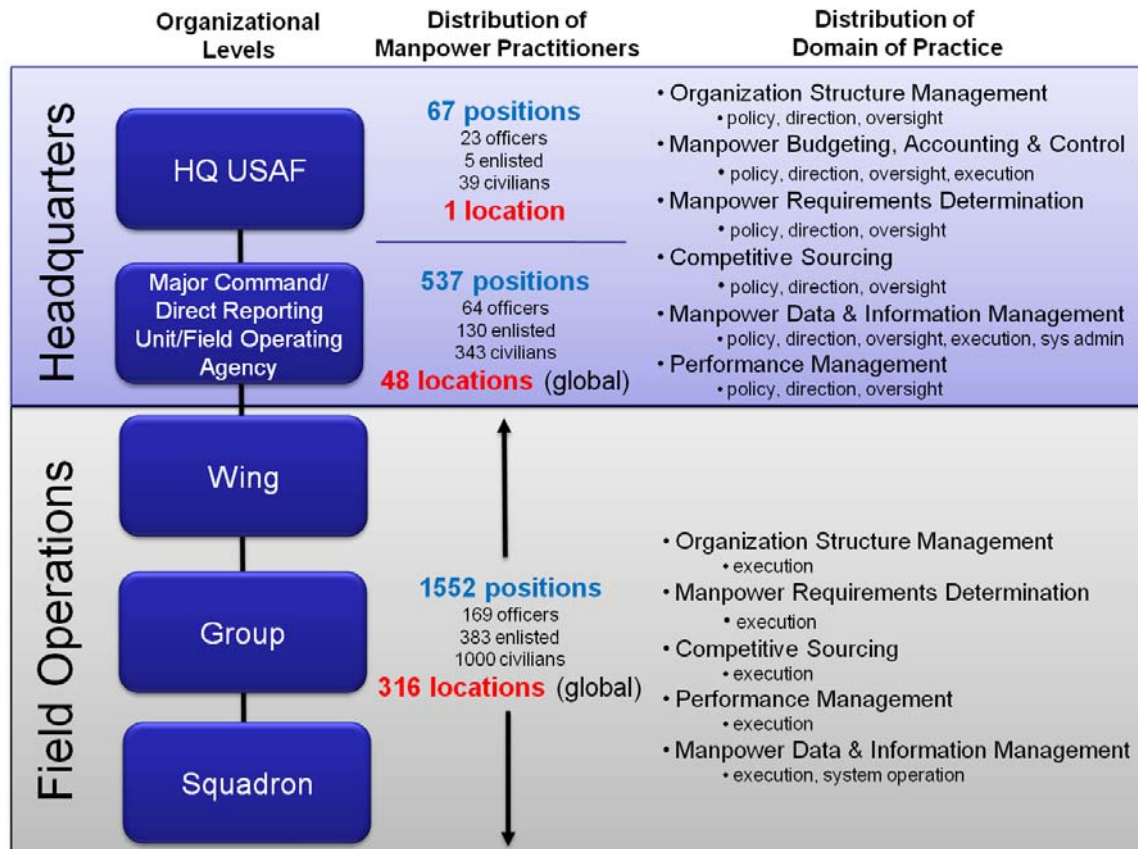
Figure 15.   Distribution of the Air Force Manpower function[30]

Finally, the Manpower function relies on experienced and interaction based learning for professional development. Full-time Manpower practitioners are developed primarily through experience and on-the-job training. New members are required to attend formal in-residence training to learn fundamental principles and concepts. More focused and advanced training is also offered at key stages of a member's career; such as deployment training, advanced skills training, and leadership seminars. The intent for this training and education is to provide the member with foundational and common knowledge that largely serve as a point of reference toward learning in the practical work place environment. Therefore, know-how is almost entirely gained through experience

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[30] Data is derived from the Manpower Programming and Execution System acquired on November 28, 2006. Information reflects manpower authorizations for fiscal year 2007 of all 3S3s and 37Fs in FAC 1080, 108A, 1081, or in Manpower function office symbols. Locations represent distinctive organizational Units differentiated by the Personnel Accounting Symbol. Positions in Joint or AF external organizations are included the HQ.

and operational interactions. This provides another key background about the Manpower function and adds further ground for the case for a knowledge-focused Manpower CoP that enables professional development.

In summary, the following key considerations are highlighted for using a knowledge-focused CoP for the Manpower function:

- To bridge the gap with knowledge shortfalls that members may experience
- To promote interaction and learning across the distribution of experience, people, places and time
- To promote professional development

2. Relevant Issues

Using a traditional military framework of organizational routines, protocols, communication and social networks, the function has performed well. However, several recent significant events have directly impacted the Manpower function and should elicit concern. Career field restructuring, attrition and accessions and force reductions have recently introduced disruptions in the stock of Manpower knowledge (see the discussion on the perishibility of knowledge in Chapter II, Section E) that may call for a strategy to overcome long-term performance challenges and seize innovative ways to better manage the function's key asset, knowledge.

The prevailing manner for managing Manpower knowledge draws from a traditional military framework. On-the-job training, formalized organizational routines (continuity documents, regulations, archives and processes), and the personnel assignment process currently serve as the foundation for managing and leveraging knowledge in the Manpower function (recall from Chapter III, Section B, that KM is a HRM issue). This author refers to this as a passive KM program, where knowledge is incidentally leveraged through the commission of HRM processes. In other words, the underlying intent is to make use of people specifically and not the knowledge that resides in them. This perspective may be a carry-over from the prevailing stream of thought that places KM in the IT department. Consider what is learned about KM as a HRM issue. Also consider that incidentally impacting Manpower knowledge may be inadequate as it is unsupervised and lacks strategic motivation. This author does not suggest changing the

current HRM process. Rather, it may be sufficient to expand the boundaries of AF KM to include HRM.   By doing so, KM is given a strategic purpose that is far more than an IT strategy. For the Manpower function, this serves as the starting point to consider the relevancy and place of KM in its long term sustainment and performance. Until now, no alternative has been presented or explored.   Therefore, this first issue provides the "grounding" needed to explore the use of a knowledge-focused CoP for the Manpower function.   Additional issues that should be considered as relevant to the need for considering formalizing a KM program for the Manpower function include:

- **Functional Restructuring.** In 2004 the Manpower function merged with the Personnel function to form a union of complimentary functions. Recently, it was decided that the Services function was also to be integrated into this expanded domain of practice.   In the short-term manpower specialists are expected to function separate from the personnel and services specialists. In the long-term members of each community are expected to meld together in experience, function and learning to truly form a coalesced enterprise. Dilution of experience as members are integrated into unfamiliar functions (e.g. a member with personnel experience is reassigned to a manpower job) should be a concern.

- **Attrition and Accessions.**   Experienced members permanently or temporarily leaving the function cannot be replaced and are normally succeeded by members with less or no experience. A degree of valued knowledge, intuition, social networks, mental models and capacities are lost with each departing member.

- **Force Reductions.** Recent force reductions have resized the Manpower function from 2,267 in FY2006 to 2,020 projected in FY2010 (11% reduction in force), without a proportional decrease in mission obligations.

3.   Leveraging Knowledge in the Manpower Community

This final section of this evaluation offers specific considerations and recommendations for how the Manpower community can leverage knowledge as a means of learning for the benefit of performance. Many useful suggestions have already been provided in the discussion about the stages for developing a CoP in Chapter IV, Section E and F, and should be referenced for a more thorough list of things to consider. Provided here are those matters of concern this author determined to warrant additional discussion relative to the context of the Manpower function. Recall that the cultivation of a community involves the creation of an environment where it can prosper. Towards this the following suggestions are made specifically for the Manpower function:

Buy-In. A precondition for the success of "Knowledge Management" – and for a Community of Practice as well – is senior management commitment. (Nissen, 2006) Consider an implementation of a CoP as a transformation effort. Although a CoP can be designed to complement the way people already work, it should be viewed as a change because it is something new. Therefore, senior leader buy-in is important and perhaps the first thing that should be achieved before proceeding further.   Manpower senior leaders should be convinced of the need to formalize KM for this community. They should also understand that KM is about what is done with knowledge in people's minds and not with how information or documents are shared. HQ USAF/A1M should consider the vital role they play for a Manpower CoP to succeed.   Strong sponsorship can provide a firm foundation on which the structure and environment of the CoP can be erected. On the other hand, having weak sponsorship would be much like erecting the CoP on shifting sand. For example, a community member interviewed, who is also a manager of a unit level AFKN CoP, believed that the lackluster participation in their unit CoP could be largely attributed to the lack of unit leadership support. In another example, a senior leader expressed skepticism about the usefulness of CoPs admitting they had never seen one that was very successful. Perhaps this sentiment is influenced by the information-focused stream of thought about KM – where knowledge is considered an object – and previous experiences with this approach. Therefore, this first consideration is a critical link and should be a first step. The Manpower senior leaders should buy-in to the need to formalize a KM program for this function.

Perspective. The second matter of concern that is a significant issue in the Air Force and in the Manpower community is perspective. For instance, at the grassroots level of the Manpower community, those people interviewed believed that the AFKN CoP they were a member of – the physical web-site – was the actual "community of practice." The boundaries of what they understood to be the CoP was contained within the virtual environment of the AFKN user interface, servers and files shared. No one had yet ventured to see the possibilities for a CoP, and even less perceived the CoP to be the people who were interacting through the AFKN tool. Again, this perspective is perhaps influenced by the prevailing information-focused stream of thought. The perspective should be expanded beyond the current boundaries and into those suggested by the

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knowledge-focused stream of thought (reference Table five). Any attempt to pursue a knowledge-focused CoP, as developed in this research, should profoundly consider the concepts and principles about what knowledge is and what can be done with it (Chapters two and three). Therefore, this is also a critical link and should be the second step. A change of perspective is called for: from an information-focused perspective – where knowledge is an object – to a knowledge-focused perspective – where knowledge is uniquely a human feature.

       Vision and Purpose. Vision and purpose are powerful vehicles that usher energy, focus and effort in a specific direction. John Kotter (1995), in his seminal work on leading organizational change, suggests that: leaders must create a vision to help direct effort, communicate that vision to help promote buy-in, and empower others to act on that vision. The strategic purpose of the Manpower function is to "Define the Force." This contributes to the strategic direction for the parent Manpower and Personnel function, which in turn contributes to that of the Air Force. A Manpower CoP should no less be included in this vision-chain. For example, the Commpanycommand.com CoP places much weight on vision and purpose. When a member logs-in, they are welcomed each time with a reminder of the CoPs purpose and vision that contributes to the overall Army mission:

- **Vision:** "Building Combat Ready Teams"
- **Purpose:** "Welcome to CompanyCommand, the professional forum by and for us – Army Company Commanders. This is OUR forum – it is voluntary, grassroots, and is focused like a laser beam on Company Commanders. By participating, you are gaining access to an amazing community of professionals who love Soldiers and are committed to building combat-ready teams."

Reviewing a sampling of the 681 Manpower and Personnel AFKN CoPS, this author could not find any that provided a vision or a purpose for their existence. Many provided the sponsoring unit's mission statement, which described what the organization does, but fell short of describing what the CoP was for. Of those community members interviewed, all of them agreed that the purpose of the AFKN CoP they participate in is for sharing information (files). For many of them, the file sharing capability is essential for their organization's mission. However, not marginalizing it, it is an example of what Wilson (2002) observed in his research that KM (to include CoPs) is being used simply

as a synonym for information management. A Manpower community CoP should consider diverging from the unwritten vision and purpose that apparently prevails across AFKN enabled CoPs – information management – and consider adopting one that places interaction and learning as the central theme. Vision and purpose is a powerful vehicle and should usher the community toward leveraging knowledge and stray away from the mainstream information management paradigm.

Expectations. Nissen (2006) warns that organizations that expect too much, too fast can "deflate support for change." A CoP should be expected to take time to implement and mature. Wenger, McDermott and Snyder (2002) observed that some CoPs quickly pass through the potential, coalescing and maturing stages, and into stewardship (see Chapter IV, Section F). Others take longer time. And others never make it past the coalescing and maturing stages. Also consider the challenge in measuring success in a CoP. This author was not able to find a quantitative manner to measure CoP effectiveness. This can be a problem for leaders who require metrics or other quantifiable measures to justify their ongoing support. However, consider the usefulness and value of anecdotal feedback. Stories and examples of how the CoP has helped members, organizations or the community are means of measuring success. Also consider how knowledge enables action, and action drives performance. Therefore, success of a CoP may be assessed (indirectly) via the success of people and organizations that participate in them. The point here is that expectations should be managed, realistic and open to qualitative feedback.

People. Recall, three defining characteristics about a knowledge-focused CoP are: people are central, knowledge is unique and only resides in people, and knowledge must flow between people to sustain the CoP. Therefore, any KM project must address people first and a CoP should contribute to this by promoting the flow of knowledge between people in a networked community. Specifically, the question here is how to make the knowledge in the heads of members of the Manpower community available to others? The following are useful considerations:

- Focus on enabling communication and interaction between community members. Connecting community members that have problems, issues or questions with people with solutions, insight, or experience should be the underlying motivation for a Manpower CoP.

- The CoP is much more than a website. Face-to-face forums are also manifestations of a Community or Practice. Wenger, McDermott and Snyder (2002) suggest that face-to-face meetings are essential for long term sustainment of a community. For example, the Manpower function hosts or participates in periodic conferences and meetings (e.g. the MPES Users Group or the Manpower and Personnel World-wide Conference). These gatherings provide an opportunity for CoP members to meet. Additionally, video teleconferencing, chat sessions, or telephone conferencing also provide means for a community to connect. The point here is that a CoP is not a website, but people connecting and interacting by any means available.

- Roles and responsibilities are critical in a CoP. Every member of a Manpower community CoP should understand their role and responsibility. Davenport and Prusak (1998) remind us that this cannot be left to a small group of people. Everyone should participate. However, roles should not add a burden to an already taxed individual.

  - Sponsor – HQ USAF/A1M should give the CoP legitimacy and support. It starts with buy-in and is followed by believing in the strategic value of the community toward achieving the Manpower function's purpose. The *Sponsor* also provides the strategic direction for the CoP and markets its value when given the opportunity.

  - Leader – The *Leader* serves as the tactical support for the CoP. This is perhaps the hardest role to fulfill, because it requires focused attention from a "leader" in the Manpower function. The *Leader* is supported by a community facilitator or a community support team. The *Leader* may best come from the staff of HQ USAF/A1M, a MAJCOM/A1M or from the Air Force Manpower Agency.

  - Facilitator(s) – The *Facilitator* is the key role that keeps the KM program and the CoP operating on a daily basis. The *Facilitator* can work alone or lead a support team. For a Manpower CoP this role may best be met by a contractor.

  - Members – The *Member* is the heart of the CoP. The *Member's* responsibility is to participate and to determine how to best mold their participation as a natural occurrence in their day-to-day work. Supervisors and leaders throughout the Manpower function should encourage participation and recognize *Member* contributions.

- Recognizing participation and contributions is another means of adding legitimacy to the CoP and is also a people issue. Contributions to a CoP can be valuable inputs to employee evaluations. Additioanlly, annual community awards can increase the visibility of the CoP and market success stories.

Structure. A CoP should not be over-managed. In other words, *Sponsors*, *Leaders* and *Facilitators* can overstep their responsibilities in a CoP. Recall from Chapter IV, the working definition of a CoP suggests: Members get involved voluntarily, do not recognize a community hierarchy or authority, and are not bound to deadlines or commitments. Many of those interviewed did not think this was realistic. One member responded that if a CoP represented another "boss" or pressure then they would not participate. The aim of the CoP is to promote interaction and the free flow of communication. HQ USAF/A1M and the appointed leader should establish and monitor boundaries for the CoP. In other words, it should not become an extension of the organization or a tool for the formal chain-of-command to use to task, direct or oversee activities.

Processes. A well designed KM program attempts to support the natural way people work. One method of doing this is to promote its use for routine tasks. Information in its supporting role has a place here. As is currently being done in the majority of AFKN CoPs, they can be used to post reference materials, community news or other relevant information. When information is relevant, timely, up-to-date and easily accessible members are likely to return if not make it the preferred place for finding information relevant to their practice.

Technology. Technology is important for a CoP, but in a supportive role. Air Force Knowledge Now provides a fully funded technology solution that can be used for a Manpower CoP. Pointing to the 681 CoPs listed in Appendix G as evidence, it is relatively easy to "launch" a work-space for a community on the AFKN site. As previously noted, the file sharing capability of AFKN is attractive. Also, consider the discussion forum, links and member profiles offered by the AFKN solution. This author believes that a Manpower CoP would benefit the most from:

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- **Discussion Forums.** A discussion forum is a means for a CoP to thematically communicate and interact asynchronously. The discussions are persistent, broadcasted for all to see, can be reused and expanded to meet the natural and evolving needs of the community members. This is a powerful tool that can be used to promote the asking of questions where the broader community may also benefit from viewing the responses. For example, a person interviewed told of the frustration and anxiety an enlisted Manpower member experienced during a pre-deployment. They expressed the need to have an easy means of finding people in the Manpower community with specific experiences and insights. A discussion forum has the potential for doing this. This author points to the work by Dixon et al. (2005) to see how Army company commanders have effectively utilized discussion forums. AFKN currently has this functionality.

- **Yellow Pages.** A Yellow Pages application offers the CoP member a means to connect with other members. It utilizes member profiles that include such information as: areas of expertise, assignments, areas of interest and others in a form factor where the information can be queried and manipulated. They further provide the ability to map expertise across the community to more easily identify a potential constituency for an issue or problem to solicit feedback or request collaboration. This functionality is not currently available through AFKN. However, it is included here to highlight a tool that this author believes would be beneficial for a Manpower CoP.

- **Wiki.** A Wiki (What I Know Is…) is an application that allows any CoP member to edit community content anytime using an internet browser. Wikis are useful to establish common meaning about ideas, terms, concepts and history of things that are relevant to the community. For example, the Naval Postgraduate School[31] saw a need to bring together a growing disparate understanding of Network Centric Operations across DoD and initiated a Wiki to create a forum to coalesce understandings to achieve common meaning. The Manpower community can benefit from such an idea. It can serve to create and share meaning, be used as a working reference, and be allowed to evolve with changes in the environment. This functionality is not currently available through AFKN. However, it is included here to highlight a tool that this author believes would be beneficial for a Manpower CoP.

Start Small. As a final consideration, start a CoP with one Manpower activity in mind (reference Figure 13) and expand to other activities once they pass the *maturity* stage. For example, plan, design and implement a CoP for the Manpower Budgeting, Accounting and Control activity. This is an activity that is almost entirely performed at

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[31] The Network Centric Operations and Warfare (NCOW) Wiki was initiated by Dr. Rick Hayes-Roth and can be accessed at: http://ncow.nps.edu/wiki/index.php/Main_Page.

the headquarters level (HQ USAF and MAJCOMs). Field operations do not directly participate in this activity, but they are the recipients and implementers of decisions made from this process. As a result, field operations lack the knowledge to answer questions and explain funding decisions they must implement. Additionally, MAJCOMs also experience similar problems when receiving direction and decisions from HQ USAF/A1M. For example, several members (Field and MAJCOM) interviewed expressed their frustration with uncertainty, lack of clarity and inexperience to implement a recent (2007) reduction in force (PBD 720). Future scenarios similar to this (community wide projects) would benefit from the interaction, sharing of meaning and information flow that a CoP enables. Wenger, McDermott and Snyder (2002) suggest achieving quick victories to give the CoP momentum for growth. By starting small, the Manpower function can capitalize and market small successes to achieve a large longer-term success.

This evaluation of the Manpower function is intended to provide specific considerations that complement those previously provided in Chapter IV, Sections E and F. It is meant to spur interest for a knowledge-focused Community of Practice for leveraging knowledge as a means of learning for the benefit of performance in the Manpower function. Provided here are those matters of concern this author determined to warrant additional discussion relative to the context of the Manpower function. In summary, this author believes the Manpower function stands to benefit from what is learned in this research about "Knowledge Management" and Communities of Practice. From the interviews conducted, this author also believes the environment to be fertile for planting and cultivating a Manpower CoP. Before beginning this venture, this author strongly believes that the considerations that need the closest attention to set a Manpower Community of Practice on a path of enduring value are:

- Manpower senior leaders should buy-in to the need to formalize a KM program for this function

- A change of perspective is suggested; from an information-focused to a knowledge-focused perspective

- Develop a vision and purpose for the Community of Practice

- Expectations should be realistic and open to qualitative feedback
- Start small with one of the many Manpower activities

B.   THE NAVY SECURITY COOPERATION ACTIVITY

The Navy Security Cooperation activity is a facet of the greater Department of Defense International Cooperation program overseen by the Under Secretary of Defense for Acquisition, Technology and Logistics (AT&L). The greater program has an extensive list of stakeholders, participating organizations and locations; to name a few: all the Services, the Office of the Secretary of Defense (OSD), and the Defense Security Cooperation Agency (DSCA). DoD Security Cooperation is ultimately concerned with promoting U.S. security and broadly identified as those activities conducted with allies and friendly nations to (DSCA, 2007):

- Build relationships that promote specified U.S. interests
- Build allied and friendly nation capabilities for self-defense and coalition operations
- Provide U.S. forces with peacetime and contingency access

Towards this, each participating organization and community member performs, to varying degrees, the following specific activities, which will be referred to as the "domain of practice" for this community (OSD, 2007):

- **National Representation.** Provide direct support and representation for all international cooperative matters
- **International Armaments Cooperation.** Facilitate international armaments cooperation with Allies and friendly foreign countries and industry in concert with the DoD policy and the National Security Strategy
- **Security Assistance and Training.** Facilitate foreign military sales, leases, grants of defense articles and services, and associated training and education of Allies and friendly foreign military
- International Research, Development, Test & Evaluation (RDT&E) of Technology and Equipment. Recommend positions on international RDT&E, procurement, exports, & logistics matters
- **International Acquisition of Defense Systems and Equipment.** Advocate international cooperation early in Component-unique and Joint acquisition programs to meet future coalition requirements. Resolve international issues associated with acquisition efforts

Figure 16, further decomposes this domain of practice into specific areas that members of this community perform. Most members only perform in specified sections of this domain and rarely cross into other sections. For example, not all members are involved with activities related with RDT&E.
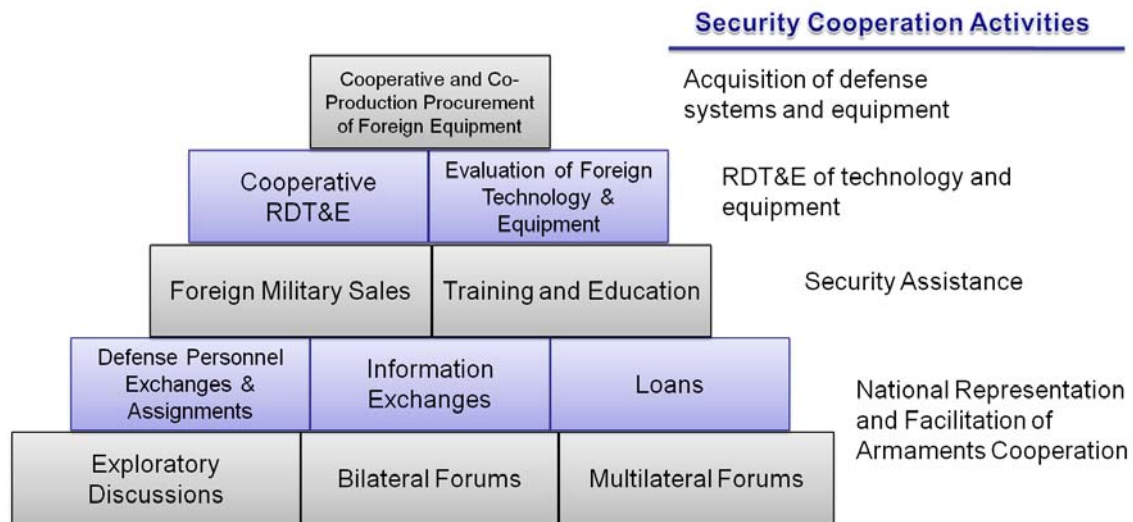
Figure 16.   Security Cooperation building blocks (After: OUSD, 2006)

Similar to the AF Manpower function, this domain of practice is largely non-routine work where inputs can be extremely ambiguous and non-linear, problems are unstructured and semi-structured and work-flow has unclear beginnings and variable ends. Field Grade Officers (0-4 and above) and senior civilians are primarily assigned to full-time roles and responsibilities in Security Cooperation activities globally. For example, Table 16 provides a list of countries where the Offices of Defense Cooperation (ODC) acts as liaison between the DoD research, development and acquisition agencies and corresponding agencies in the host nation.

Australia	France	Italy	Singapore
BELLUX	Germany	Japan	South Korea
Canada	Greece	Netherlands	Spain
Chile	Hungary	Norway	Sweden
Czech Republic	India	Poland	Turkey
Denmark	Israel	Romania	Ukraine
		South Africa	United Kingdom

Table 16.   Countries with Cooperation Personnel Assigned (From: OUSD, 2006)

Know-how is principally gained through on-the-job experience and supported by the network of professional relationships established independently by each community member.   At present, no formal or informal community exists in the spirit of a Community of Practice described in the Chapter IV.   A common operating environment (telephone, internet, e-mail, Microsoft Office suite, etc.) enables interaction between members.   Although promoting cooperation between international parties is the focus of their business, internal interactions and cooperation between community members (U.S. personnel working under one of the stakeholders previously mentioned) is even more critical to performance.

1.   A Case for a Security Cooperation Community of Practice

Members of the Security Cooperation community must constantly apply judgment, discretion and careful evaluation of issues and problems due to the nature and ramifications of unfavorable results caused by adverse actions. One community member interviewed suggested that people are worried about doing the right things on a day-to-day basis. Indeed, this reflects the imperative that OSD places on this community:

> …personnel must ensure that their international cooperation related-activities fully comply with the wide array of statutes, directives, instructions, regulations, and policies that govern DoD armaments cooperation efforts. Prior consultation with DoD international program organizations (including legal counsel)…is the most effective way to

comply with the specific legal and policy requirements that may apply to a given armaments cooperation initiative under consideration. (OUSD, 2006)

Many community members, specifically those assigned in-country (such as those in an ODC or a Component overseas office like the Office of Naval Research liaison offices) are committed to identifying and making recommendations for cooperative opportunities with the host nation, identifying points of contact, suggesting timing or lines of reasoning in presenting a U.S. position. This requires them to frequently apply judgment in isolation because no one else in DoD may have the in-country perspective and unique insight of that member or office. The Security Cooperation leadership (OUSD(AT&L), DSCA, and Component organizations) is aware of the need to support these situations with assistance. OUSD(AT&L) (2006) suggests that "the common and most critical element is maintaining the 'two-way street' of information flow and minimizing misunderstandings." They further recognize that "too much unsolicited help may become 'meddling'; too little may lead to the perception of being 'non-responsive'." The point here is that involvement in these international cooperative programs can be a delicate affair and apparently requires members to have the knowledge to take action independently or know where to get it. Hence, their task of promoting cooperation between nations begins with seeking cooperation within their functional community.

The Office of the Chief of Naval Operations (OPNAV) recently began to take steps to address the issue of cooperation within the Navy component of the greater Security Cooperation activity. The Director, Warfare Integration/Senior National Representative (OPNAV/N8F) partnered with the Navy International Programs Office (NIPO), the Space and Naval Warfare (SPAWAR) Systems Center in San Diego (SSC-SD) and the Naval Postgraduate School (NPS) to launch the "International Bench" with the intent to improve the problem solving, issue resolution, learning and collaboration across the Navy's global Security Cooperation community. To this end, SSC-SD began the effort by developing a pilot web-based application (work began in February 2007 with iterative improvements continuing). Their objective was to "establish a collaborative environment in which to share information relevant to those [Security

Cooperation activity] processes." (SSC-CD, 2007) Figure 17 illustrates the functionality of the current iteration of the pilot project developed and launched by SSC-CD.
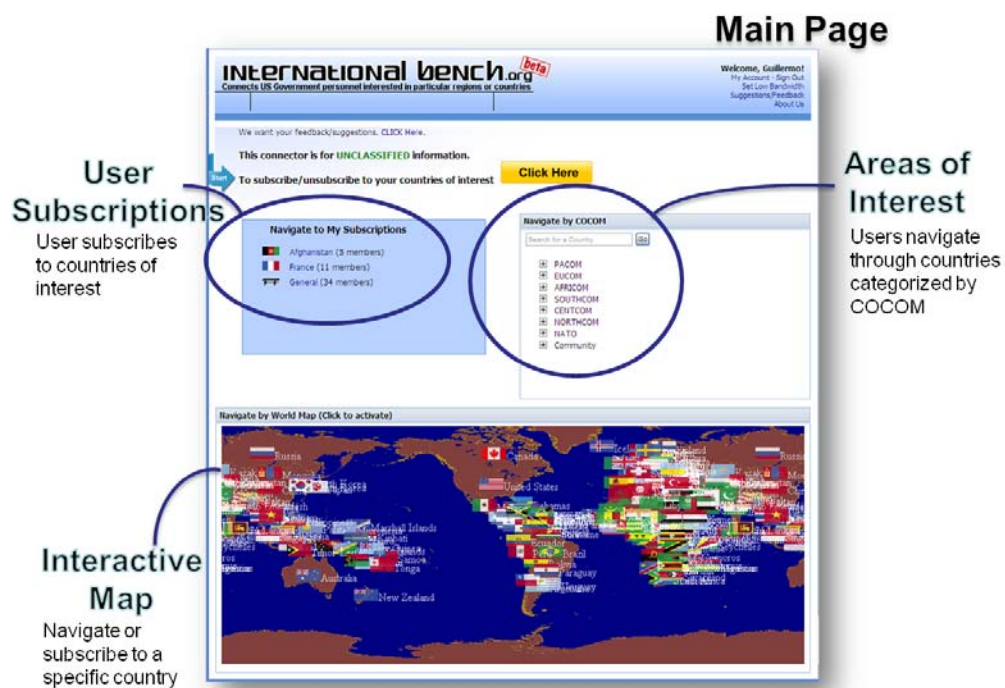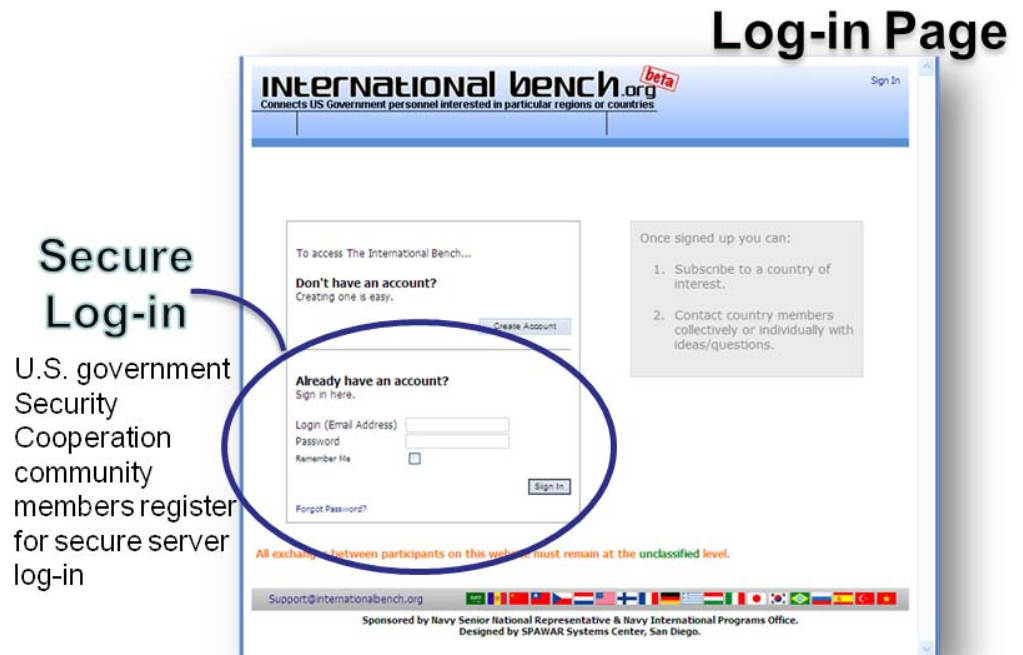
Example of Country Specific Page

Figure 17. SSC-SD developed "International Bench" pilot project (From: http://web.internationalbench.org, Retrieved on September 13, 2007)

In July 2007 the Naval Postgraduate School (NPS) was asked by the Navy Senior National Representative (SNR) to provide research assistance for the "International Bench" project. Their objective was to evaluate the pilot project, explore extant collaborative technologies and recommend improvements. As a student project [32], the research focused on technology considerations. Missing was consideration for the social elements – interaction, learning, roles and responsibilities, or structure – that was outside the scope of the student project. Since the characteristics of this case – distributed community, time and place was an issue, member interaction sought, and information and knowledge sharing was desired – fit well within the boundaries of what could be addressed by a Community of Practice, this author continues that work by specifically addressing the socio-technical design not covered in the student project. Therefore, as previously stated, the intent here is to provide the Navy Senior National Representative

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[32] NPS participation was made possible by Dr Alexander Bordetsky, through the NPS Center for Network Innovation and Experimentation (CENETIX). Dr Bordetsky supervised this project as a student research project for IS4188, Collaborative Technologies. The student project team included: Major Joe Delaney, USMC; Major Guillermo Palos, USAF; Captain Rich Garcia, USMC; and Lieutenant Rob Biggs, USN.

with considerations toward directing a new community toward a vision that is based on those principles discussed in this research for long term sustainment and growth that will enhance current and future work.

2. Beneficial Preconditions

Unlike the relevant issues facing the Air Force Manpower function, the Navy Security Cooperation activity has a few positive preconditions that are of immense value:

Sponsorship. Recall from the previous discussion, *The Case for a Security Cooperation Community of* Practice, several positive elements are in place to give this effort traction. Of these, having a *Sponsor* is an immense benefit. Further, having a *Sponsor* who believes in the vision and purpose of this effort is doubly beneficial. OPNAV/N8F, Senior National Representative (SNR) is clearly the right *Sponsor* for this effort. Several of the members of the Security Cooperation activity that were interviewed expressed their satisfaction that SNR was the *Sponsor*. As previously discussed, the S*ponsor* provides legitimacy and strategic direction for the CoP. As the senior Navy executive for matters on Security Cooperation, the influence, weight, credibility and push SNR stewards is an invaluable asset for this effort. Therefore, this project has in-place the first ingredient for the mix that should be used to lay a firm foundation for this effort.

Perspective. From the interviews conducted, the Navy Security Cooperation community does not seem to have any experience with formal Communities of Practice. Consider that this may be a benefit. Several of the members interviewed, when asked to describe a vision for a SC CoP, offered characteristics that were more consistent with a knowledge-focused approach than an information-focused approach. To generalize, the comments captured the following themes:

- A CoP should be clear, easy to use, meaningful, and provide accesses to the right people all over the world all the time (24/7)
- A CoP should be a place to ask questions and get answers
- There are enough bosses as it is, a CoP should not become one more
- A CoP should help new people spin-up and accelerate learning
- Participation needs to be voluntary

- A CoP should allow every community member admission and permit them to decide how and how much to participate

- A CoP should promote collaboration between its members

- A CoP provides a website where people can gather and interact, access late breaking news, leadership messages, community activities (e.g. meetings or conferences), and find updates on extant projects or cases

- A CoP should be useful to support the work that is being accomplish

Indeed, discovered here are themes that are profoundly representative of general expectations that indicate a perspective which should benefit a knowledge-focused approach to a CoP. Hence, from this feedback, it may be reasonable to assume that there is a general perspective that is supportive of a knowledge-focused approach to KM. In contrast to the current prevailing perspective in the Manpower function, this sampling serves as an indication that the SC culture may be friendly to the concepts learned in this research.

Vision and Purpose. When SNR solicited research assistance from the Naval Postgraduate School (NPS), they described the purpose of the "International Bench" as being a tool to share information and connect people. The NPS student research team provided several recommendations that SNR is currently considering. A recommendation made was for SNR to formalize and adjust the purpose and vision of the "International Bench" to better set the effort in a positive and clearly focused direction.

- Suggested Purpose: The International Bench is a virtual gathering place where members practicing Security Cooperation activities can share and learn from one another by sharing information, problems, experiences, insights, templates, tools and best practices.

- Suggested Vision: "To promote learning through interaction toward job performance."

Eugene Sullivan, Deputy, Senior National Representative, found this recommendation to be useful. (personal communication, August 16, 2007) This author believes this to be a good start, but additionally requires SNR to take ownership of it and adjust it based on their priorities, focus and perspective. As previously stated, vision and purpose are powerful vehicles that usher energy, focus and effort in a specific direction. The NPS student team provided a solid suggestion for SNR to consider, as the *Sponsor*, to set the long-term strategic direction for the International Bench.

Technology. Also Beneficial to this effort is the technical and development support provided by the SPAWAR Systems Center – San Diego (SSC-SD) and the research and experimentation support provided by the Naval Postgraduate School. This cooperative effort is a relationship that SNR should capitalize on. The technical expertise and responsiveness SSC-SD combined with the energy, curiosity and innovative thinking of NPS students is beneficial. In contrast to the limited options that the AF Manpower function has for choosing a technology solution for their CoP, SNR has the means to explore differing applications that would best meet the needs of the Security Cooperation CoP. This support can also deviate from SNR's intent. Therefore, the importance of formalizing the vision and purpose weighs-in here to add clarity and unity of effort between SSC-SD and NPS. The relationship in-place is a beneficial precondition, but will require a unifying force; such as a formal strategy document or program plan to bring together the activities.

3.   **Leveraging Knowledge in the Security Cooperation Community**

As was done with the previous evaluation, this final section offers specific considerations and recommendations for how the Security Cooperation community can leverage knowledge as a means of learning for the benefit of performance. Again, this author points to the many useful suggestions provided in the discussion about the stages for developing a CoP in Chapter IV, Section E and F, and should be referenced for a more step-wise list of things to consider. Provided here are those matters of concern this author determined to warrant additional discussion relative to the context of the Security Cooperation activity. As was done with the Air Force Manpower function, the intent here is to offer suggestions for how to create an environment for a community to prosper. Towards this, the following suggestions are made specifically for the Navy Security Cooperation (SC) activity:

Buy-In. With SNR as the *Sponsor,* senior level commitment is partially achieved. Several community members commented that SNR was the right office to sponsor this effort. However, several also suggested a need to gain broader support for the effort from other senior level stakeholders; such as from the Navy International Program Office, or the Office of Naval Research, to name a few. This can be a

challenging task due to differing organizational priorities and focus. Although it deserves SNR's attention, this author does not believe it necessary to gain broader executive support with the initial venture. SNR is better advised to seek grassroots level buy-in from users by demonstration and marketing of the purpose and vision, and the current pilot program. Seeking grassroots level buy-in will be needed to seed initial participation toward achieving quick successes.

People. Again, any KM project must address people first and a CoP should contribute to this by promoting the flow of knowledge between people. Here, the SC community already has good footing with the preconditions addressed previously. Connecting people seems to be the intent with SNR. Therefore, just a few considerations are offered:

- Design for a virtual community. Face-to-face interaction between distributed community members seems to be a difficult option due to the distributed nature of this community. Not only are they distributed across place and time, but they additionally span across a diversity of organizational and functional boundaries, and chains of command. Therefore, it is conceivable that the Security Cooperation community be entirely a virtual community. The implication of this is that the community must fully rely on technology to enable interactions between members.

- Roles and responsibilities are critical in a CoP. Therefore SNR should consider its importance and assess the design of this CoP by how each role may be fulfilled. This author recommends that participants acknowledge the role and responsibility they play as a condition for admission. This can be achieved as part of the registration process.

  - Sponsor – Reference the discussion in the previous section on sponsorship.

  - Leader – A *Leader* should be selected that is within the chain-of-command or influence of SNR and easily accessible by the facilitator. This individual should be looked upon by the facilitator for tactical level direction of the International Bench. Currently, the Deputy SNR appears to be serving in this capacity. He is providing the day-to-day guidance and making decisions regarding direction and investments. Will the Deputy SNR be able to provide sustained long-term focus on the International Bench while other significant issues compete for the attention of his office? Consider the implications, workload and focus that will be required of the *Leader* in the future. This role may be better delegated to someone that will be able to provide sustained focus.

- Facilitator(s) – The *Facilitator* will need to be a full-time job. Referencing the "stages of community development" (Chapter IV, Section F), the *Facilitator* will be deeply involved in those support activities suggested in the *Potential, Coalescing* and *Maturing* stages. The facilitator should report to the *Leader* and support the *Members*. When membership grows, it may be necessary to create a larger support team. This is the role that keeps the CoP together and on a consistent path to meet the strategic purpose and vision set forth by the *Sponsor* and the tactical level directions provided by the *Leader*. This role should be filled by a contractor.

- Members – The *Member* is the heart of the CoP. Therefore, the CoP design should seek to connect the *Members*. Although membership and participation should be voluntary, some commitment should be required. They should be asked to acknowledge the vision and purpose for the International Bench. They should also be asked to contribute to the interactions, discussions and content whenever possible so as to build the richness of the environment. They should also be asked to complete a member profile. Finally, they should be asked to provide user feedback periodically to help the support team assess the health of the community. The member's role is to participate and to determine how to best mold their participation as a natural occurrence in their day-to-day work.

Processes. A well designed KM program attempts to support the natural way people work. However, due to the size and distribution of the SC community, it is a difficult matter to assess and fit a CoP to accommodate the limitless diversity of this community. Therefore, the virtual workspace (functionality, interface and usability), that is the International Bench, may only subtly address this design imperative. One member interviewed suggested that it should be clear, easy to use, meaningful, and provide accesses to the right people all over the world all the time. Another member suggested that it should not be cluttered and difficult to find things. These suggestions describe a virtual work environment that perhaps addresses basic needs that may support the way they work, therefore should be considered.

Another consideration is closely tied to the suggested vision for the SC CoP – promote learning through interaction – and perhaps should be considered as a goal to achieve. The International Bench should offer functionality that is likely to be adapted as an essential element of the member's work routine. For example, as a hypothetical scenario: a member requiring focused insight about a specific country has learned to first

turn to the International Bench's Yellow Pages or member directory to find a contact. When information is relevant, timely, up-to-date and easily accessible members are likely to return if not make it the preferred place for finding information relevant to their practice.

Technology. Technology is important for a CoP, but in a supportive role. Recall, in a previous suggestion, the SC CoP should be designed as a virtual community. Therefore, the role of technology as an enabler here is critical. Drawing from the suggested purpose and vision for this CoP, consideration should be made for three capabilities illustrated in Figure 18:

- **Subject Matter Expert (SME) Search.** The purpose of this sub-function is to provide a means for a member with a problem, issue or question to find another member with potential to provide insight, experience or suggestions. The assumption is that the community member will locate the appropriate SME to interact with them and subsequently learn toward taking action. If the community member is unable to find an SME, a facilitator or another community member acts as a "connector" for the needing member and someone with the potential knowledge.

- **Discussion Forum.** The purpose of this sub-function is to provide a means for a member with a problem, issue or question to find a discussion thread that may provide information they can learn from and subsequently resolve their issue from what they learned. It also allows them to start new discussions to solicit responses.

- **Information.** The purpose of this sub-function is to provide a means for a member with a problem, issue or question to find relevant information for resolving their issue.
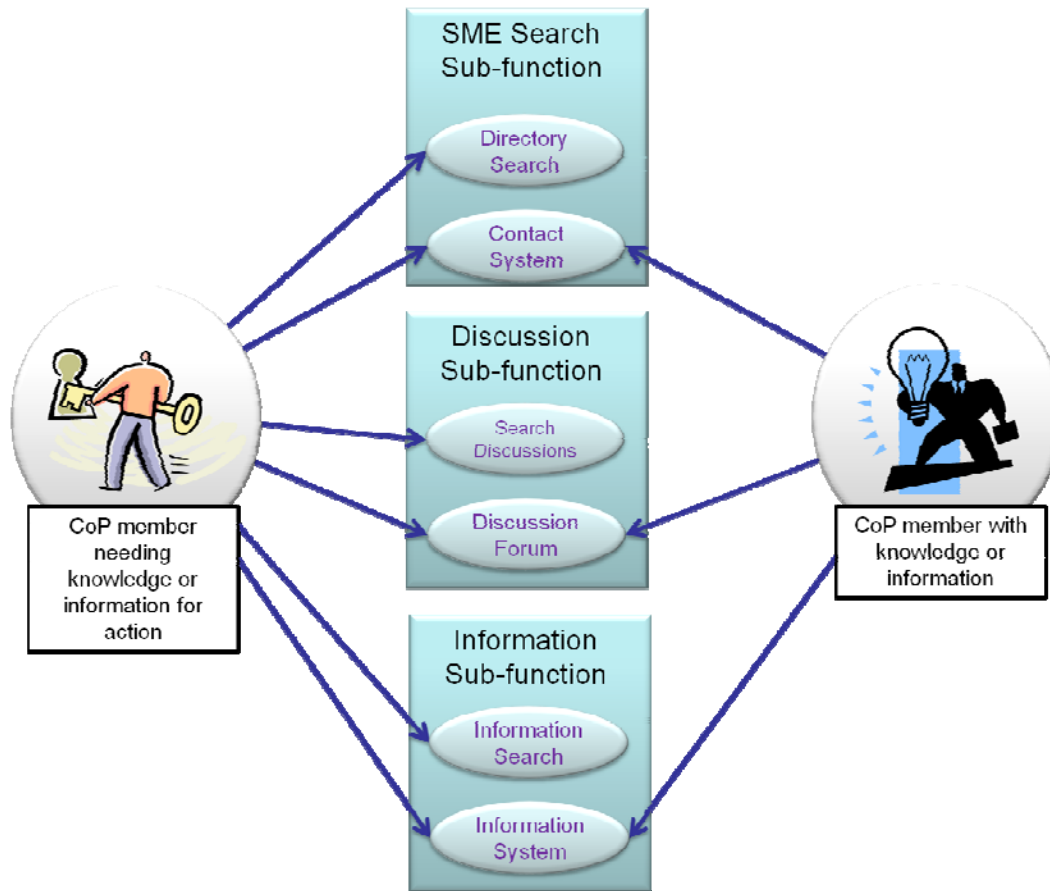
Figure 18.   Security Cooperation International Bench Functionality

Three basic paths, depicted in Figure 19, would be available to the member needing to learn: they can search for an SME and contact them through any available medium (e.g. email or phone), find an existing discussion or create a new one, or search for information.
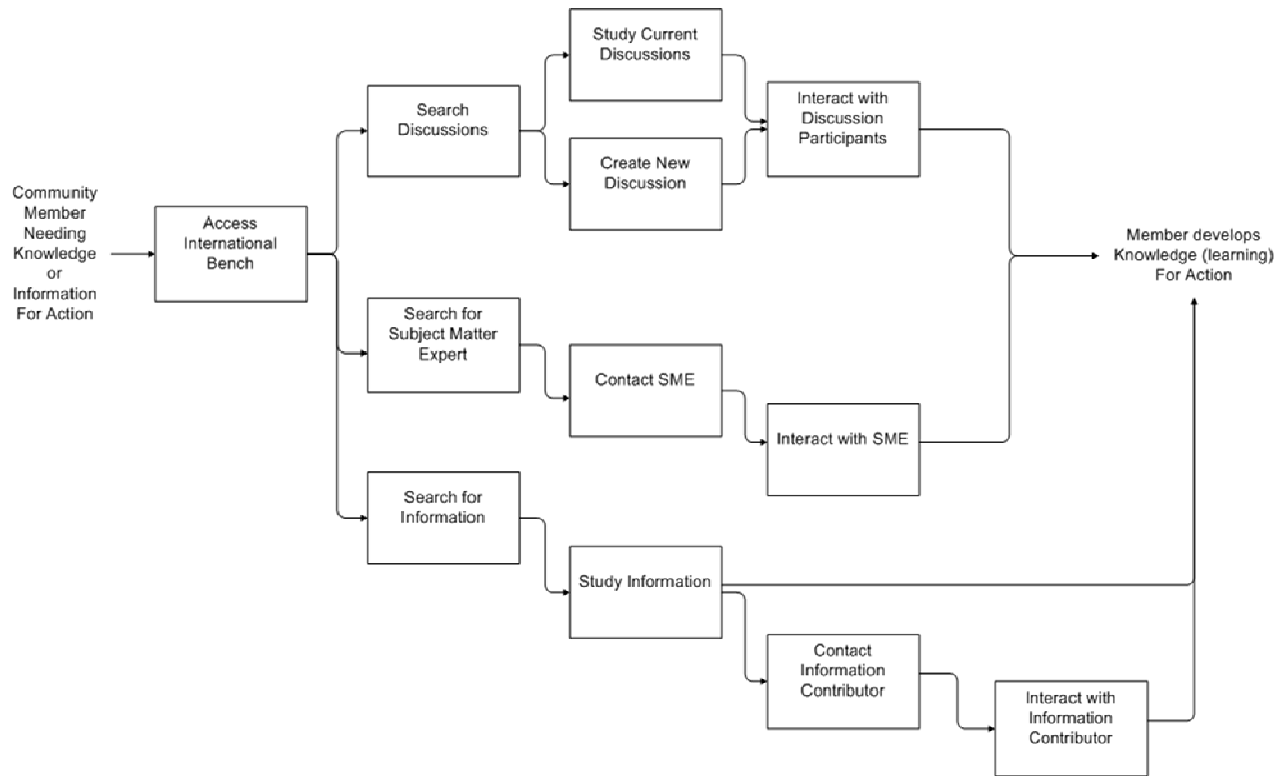
Figure 19.   Learning process enabled by the International Bench

- **Future Considerations.** At Appendix F are additional considerations for means to enable interaction and learning. Yellow Pages, Blogs and Wiki technology all provide beneficial features useful for a community of practice. These applications were not suggested here since they would represent more than what is needed for an initial launching of the International Bench technology. However, future iterations should consider them.

Participation. A final consideration is participation. Ultimately, participation may be seen as the primary measure of success. Indeed, without participation, executive support for the International Bench should be expected to diminish over time. Unfortunately, for a voluntary forum, such as this, participation is hard to design for and sustain. This is the same challenge that private sector enterprises must deal with. The challenge is in consistently offering value for members, which gives them a reason to return. Previous discussions provided suggestions that should be found useful to increase the CoP's worth; such as supporting the way people work, having a customer focused facilitator or providing enabling technology that is intuitive and easy to use. This issue requires innovative thinking and staying abreast about user needs. For this research, the

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interviews conducted provided some insight into what they thought would help address participation. Each member interviewed was asked the following question: how can we build a case for membership to the International Bench community? What follows are generalizations of the comments received that should provide useful hints for consideration in addressing participation:

- Build a value proposition for the International Bench. One member interviewed could not see the value in the International Bench concept. Another member warned that many will be reluctant to take time out of their busy schedules if they do not understand the benefit of participation. They suggested a value proposition may be useful to gain support from the skeptics. See the example value propositions provided in Chapter IV, Section C.

- Seeing is believing and believers are new members. Therefore, small but quick victories are effective. Incremental implementation and fielding of International Bench capabilities are encouraged. One member recommended that a small core group be recruited as pioneers to discover and report of benefits. (reference the discussion from Chapter IV, Section C3 regarding levels of participation). Another member was against the idea of having a core group from a concern that it would turn into an exclusive club.

- Use the International Bench as a place to bring people together. Several members commented on the lack of unity of effort across the Security Cooperation community. One member suggested that this may be the useful vehicle to promote collaboration between members and be used by senior leaders across the Security Cooperation community to keep the field informed.

- Members want to see the leadership in their chain-of-command supporting this effort. One member commented that if they saw their leader involved, they would be involved.

- Capture the attention of new members of the community. A member commented that "fresh" faces are more likely to find value due to job inexperience and the need to build their social networks. Another member commented that they wished they had such a tool when they started in Security Cooperation. Methods should be sought to capture the attention of new arrivals.

- Capture the attention of all members. A member commented that if relevant, timely and up-to-date information is available on the International Bench it will be used. This is a problem with other sites. Information gets stale very quickly and little effort is placed on refreshing

information. Another member commented that perhaps the most important piece of information to include is a directory to connect with people, offices or organizations.

This evaluation of the Security Cooperation activity is intended to provide specific considerations that complement those previously provided in Chapter IV, Sections E and F. It is meant to spur interest for a knowledge-focused Community of Practice for leveraging knowledge as a means of learning for the benefit of performance in the Security Cooperation activity. Provided here are those matters of concern this author determined to warrant additional discussion relative to the context of the Security Cooperation activity. In summary, this author believes the Security Cooperation activity stands to benefit from what is learned in this research about "Knowledge Management" and Communities of Practice. From the interviews conducted, this author also believes the environment to be extremely fertile for planting and cultivate a CoP. Additionally, this author found that there are significant positive preconditions in-place that should serve to jump-start this community. However, more needs to be done:

- Grassroots level buy-in should be sought

- Roles and responsibilities should be addressed by SNR

- Seek to develop a community design that best meets basic needs

- A technology solution should have the capability to find SMEs, support asynchronous discussions, and have a searchable information sharing capability

- Address participation with innovation and by staying abreast of user needs

VII. CONCLUSION

Knowledge, arguably, is the preeminent asset in the Military. With it, military members are able to act, leaders are able to make decisions, and organizations are able to predict and control events around them. Hayes-Roth (2006) also adds that "knowledge amplifies physical power."   Indeed, knowledge is power and a military that can effectively leverage knowledge is powerful. Therefore, leveraging knowledge should be a pivotal issue in the Department of Defense. Unfortunately, it is receiving little strategic attention and is primarily a secondary concern that is overshadowed by the momentum of "information superiority." (reference Chapter III, Section E) As a result, "Knowledge Management (KM)" programs – such as Communities of Practice – are emerging in an information-focused manner where the intent is to connect people with information. This prevailing trend is representative of what many believe to be information management programs misrepresented as KM. (e.g., Hildreth and Kimbel, 2002; Miller, 2002; Wilson, 2002) This thesis found that this is largely attributable to a fundamental misunderstanding of what knowledge is and how it can be harnessed. Moreover, also lacking is an appreciation for the possibilities and benefits that a knowledge-focused perspective to KM offers – where the value of knowledge comes out when it is leveraged; such as effective learning and interactions, innovation and sustainable competitive advantage.

This thesis directly faces these issues and develops a concept about Communities of Practice that departs from what is primarily understood and seen in the military today – a focus on information and technology. Explored is the concept that KM and CoPs should be primarily concerned with learning and leveraging know-how. Beyond this, several new ideas unfamiliar in the Military environment are introduced.   For example:

- Knowledge is not interchangeable with information or data (Chapter II, Section B)
- Knowledge cannot exist outside the human mind, and be saved in files, documents or websites (Chapter II, Section C)
- Knowledge can be lost (Chapter II, Section E)

- "Knowledge Management" is largely a Human Resource Management issue, therefore does not belong in the Information Technology/Communications department. (Chapter III, Section B)
- Communities of Practice are entirely about People (use of technology is optional) (Chapter IV, Section B)

Most attractive about this research is that it offers insights into how the Military can improve communication and collaboration, reduce learning time, and improve problem solving speed and quality with a Community of Practice. Additionally, it also provides an application template that can be used to analyze and tailor a CoP to fit tactical, strategic and staff activities. This adds substantially to the very limited set of tools and techniques available at present to leverage knowledge in military organizations.

The reader should consider that the central theme of this research is about leveraging knowledge for reasons of increasing the Military's warfighting ability. With similar intent, the Secretary of the Air Force intended to stimulate His Service with a "Letter to Airmen" that included this encouragement:

> I encourage each of you to challenge yourself and those around you to be the most Knowledge-Enabled Airmen. Take advantage of every opportunity to increase your knowledge, then develop and exploit new technologies and tactics to increase the Air Force's warfghting prowess. (SECAF, 2007b)

Using this similar spirit as the vital force for this entire writing, this final chapter serves as a summary, chapter by chapter, of what is learned about knowledge, "Knowledge Management," and Communities of Practice. This chapter and thesis concludes with a brief discussion of areas suggested for further research, which should serve as a guide for future thesis students or organizational "knowledge managers" to build upon this work.

A. SUMMARY

Drawing from the central theme – leveraging knowledge for sustained competitive advantage – this thesis explores concepts from advanced theory pertaining to knowledge dynamics to better understand how they can be used for improving organizational performance. It examines Communities of Practice as a structured "Knowledge Management" program and applies what is learned to the Air Force Manpower function and the Navy Security Cooperation activity. By doing so, it adds to

our understanding of what knowledge and "Knowledge Management" are and their implications on a Community of Practice. The following recapitulates those fundamental concepts this thesis found that build on each other and are central for understanding how the Military can benefit from a knowledge-focused CoP:

Regarding Knowledge (Chapter II): Knowledge is valuable because it enables action and work. Therefore, the first step toward harnessing knowledge for organizational performance is to have a clear understanding of what it is and the abstract and dynamic nature of its presence. Organizations must engage in managing activities that promote the flow of knowledge from those who have it to those who need it. By doing this, the organization is better set to draw benefits from the power of knowledge. Further, by appreciating the implications of the characteristics of knowledge, presented in Chapter II, the organization is better prepared for developing a "Knowledge Management" program. The following five fundamental characteristics of knowledge are key:

- **Knowledge is unique and is not data or information.** Unlike data and information, it enables direct action and knowledgeable people seldom experience "knowledge-overload."

- **Knowledge resides in the human mind**. Knowledge involves human cognition, in some way, that emerges after being processed by elements of the human mind: experience, ground truth, complexity, judgment, rules of thumb and intuition, and values and beliefs.

- **Knowledge exists in a tacit or explicit state.** Tacit knowledge is deeply embedded in the individual, hard to express and anchored by those elements previously mentioned. Explicit knowledge is more easily expressed.

- **Knowledge is perishable.** Organizations lose knowledge assets when they lose people. It can also be lost due to decay as it becomes less relevant over time. Organizations cannot "save" knowledge in files or document archives.

- **Knowledge must flow across place and time to be useful.** Knowledge originates and terminates in the minds of people. Therefore, for it to be useful it must flow from who has it to who needs it.

Regarding "Knowledge Management" (Chapter III): "Knowledge Management" is not new, and can be described and implemented using a variety of perspectives. In the military, an information-focused perspective prevails where

knowledge is treated as an object and KM programs seek efficiencies in performance through accessibility to information. Therefore investments are made in technology and information systems. In contrast, Chapter III introduces a different perspective that draws from those fundamental characteristics of knowledge discussed in Chapter II. The knowledge-focused stream of thought seeks effectiveness in performance by leveraging knowledge, enabling knowledge flows, and promoting creativity and innovation. Therefore, investments are made in people, trust, culture and learning. What is learned is that a knowledge-focused implementation of a CoP is most beneficial to learning and knowledge flows since this stream of thought seeks to connect people to promote learning and an effective capacity to act. In comparison, the former perspective seeks to connect people to information as the means to achieve an efficient capacity to act. Both are useful. However, since the knowledge-focused approach places greater weight on valuing knowledge as a uniquely human feature (vs. knowledge as an object), this research considers it over other approaches toward sustaining performance, deprecating ineffective practice and promoting innovation. The following four fundamental characteristics about "Knowledge Management" are key:

- **People are central; knowledge resides and flows between people.** KM projects must address people first and making their knowledge available to be leveraged for organizational performance. Therefore, a knowledge-focused KM design is concerned with the flow of knowledge between people.

- **Structure in the organization or community can make knowledge accessible and useful**. KM projects should address the internal and external organizational environment; such as organizational structure, culture or relationships. From a member's perspective, the environment should facilitate participation in the KM program.

- **A "Knowledge Management" program should support the natural way people work.** KM projects should consider ways of fitting to the way people work. Participation in a KM program should not be perceived as extra work, but regarded as a natural part of one's job.

- **Technology plays a supportive role.** The knowledge-based view of KM sees technology as important, but in a supportive role. It can provide a substantial boost to work flow and knowledge flow, but should not be the central focus in a KM program.

Regarding Communities of Practice (Chapter IV): A Community of Practice is an approach to "Knowledge Management." Drawing from what is learned in Chapters II and III, Chapter IV centers on a knowledge-focused implementation of a CoP as beneficial to learning and knowledge flows since it seeks to connect people to promote learning and an effective capacity to act. Therefore, this type of a CoP is described as a group of people mutually interacting and communicating to learn from each other. Further, members – face-to-face or virtually – share information and what they know, explore new ideas and help each other solve problems. The following five fundamental characteristics about Communities of Practice are key:

- **Communities of Practice are social entities.** Characterized by mutual interactions, communications and learning, CoPs are indeed social undertakings where members learn by the interactions that occur. This may be a threat to efficiency, but they promote effectiveness.

- **Communities of Practice need to be cultivated and supported.** Cultivation of a CoP is about creating an environment in which it can prosper by valuing the learning they do, making time and other resources available for their work, encouraging participation, and removing barriers.

- **Communities of Practice are sustained by the flow of knowledge.** When knowledge flows learning is taking place. For a knowledge-focused CoP, learning is central. Therefore, for a CoP to endure it should look to promote a healthy flow of knowledge between its members.

- The KM framework using People, Work Processes, Structure and Technology can be extended for use to lay a foundation for building a distributed Community of Practice upon. The KM framework is generalizable to accommodate the variety of methods and degrees of Community of Practice implementations. Therefore, consideration should be made for these organizational elements – personnel, work processes, structure, and technology.

- **The "Stages of Community Development" can be used as a practical guide for implementing a Community of Practice.** CoPs develop over time across several stages: potential, coalescing, maturing, stewardship, and transformation. A CoP should be expected to take time to implement and mature. Some quickly mature into stewardship. Others take longer time. And others never mature.

Regarding Designing a Knowledge-Focused CoP (Chapter V): The military stands to benefit from a knowledge-focused Community of Practice since it opens up possibilities that cannot be addressed with an information-focused CoP. Unfortunately, the information-focused approach prevails in the military. Therefore, Chapter V

evaluates the Air Force Manpower function and the Navy Security Cooperation activity to assess how a knowledge-focused approach could be used for these two military activities. The intent is to provide these two functions with considerations for directing a new community toward a vision that is based on those principles discussed in this research for long term sustainment and growth. The following recommendations are offered to complement stage-by-stage suggestions given in Chapter IV, Sections E and F, for developing and cultivating an enduring CoP:

For the Air Force Manpower function this author suggests:

- Manpower senior leaders should buy-in to the need to formalize a KM program for this function

- A change of perspective is suggested; from an information-focused to a knowledge-focused perspective

- Develop a vision and purpose for the Community of Practice

- Expectations should be realistic and open to qualitative feedback

- Start small with one of the many Manpower activities

For the Navy Security Cooperation activity this author suggests:

- Grassroots level buy-in should be sought

- Roles and responsibilities should be addressed by OPNAV/N8F

- Seek to develop a community design that best meets basic needs

- A technology solution should have the capability to find SMEs, support asynchronous discussions, and have a searchable information sharing capability

- Address participation with innovation and by staying abreast of user needs

B.   AREAS FOR FURTHER RESEARCH

This thesis investigates many topics to develop a knowledge-focused approach for KM in the Military. However, there is much more that can be learned about leveraging knowledge. Many issues are deeply investigated, such as knowledge, "Knowledge Management," and Communities of Practice. Others are lightly explored, such as concepts on learning, and technologies for CoPs. There are also areas that are missing from this research, such as manners for assessing CoP performance and analysis of information-focused CoPs in the military. Those areas lightly covered or missing are either outside the scope of this research or time constraints do not permit further study.

Therefore, this thesis concludes with a brief discussion of areas suggested for further research, which should serve as a guide for future thesis students or organizational "knowledge managers" to consider. The following represents topics this author believes would closely build upon this work:

Accumulation of Knowledge. In Chapter II, the concept of "stocks and flows" of personal and organizational knowledge is introduced. This borrows from System Dynamics theory, which is an approach for understanding the behavior of complex systems over time. This author found this tool to be extremely useful for understanding and mapping various variables that have an impact on the accumulation of knowledge. The analysis accomplished here is limited to what is drawn from basic knowledge "stocks and flows" for individuals (Figure 5) and organizations (Figure 4). Appendix A represents a broader attempt to understand those things that impact the stocks of knowledge in an organization. However, this comprehensive model is for illustration only and not a working model. Significantly more work is required to improve this "stock and flow" model. A working model would enhance this research by providing a KM tool that allows "knowledge managers" to simulate adjustments in the organizational environment to determine optimal decisions for improving the flow of knowledge. This presents an opportunity that may be ground breaking for KM if System Dynamics can be used as a tool to help "knowledge managers."

Learning Toward a Capacity to Act. Chapter III, Section C, examines methods for harnessing knowledge flows and introduces tools that are considered effective for learning. Due to the scope of this research, this author is unable to explore the spectrum of tools depicted in Figure 8. What does each tool offer? How can they be utilized most effectively? How does each one contribute or disturb the balance between exploitation and exploration in an organization? These questions are left unanswered. The topic of learning in a military organizational setting – in a tactical environment – is yet to be explored. The traditional paradigm places emphasis on formal training and education as a primary means for learning. KM presents the Military with innovative ways to promote learning toward a capacity to act. This author believes that the "spectrum of tools for

learning" should be further examined to provide leaders options for managing the balance between exploitation and exploration. Therefore, this presents an opportunity to continue work on an important issue introduced here.

Roles and Responsibilities in a CoP. The importance of roles and responsibilities is highlighted throughout Chapters three, four and five. However, this author found it a challenge to operationalize this issue in the specific context of the two case studies evaluated in Chapter V – the Air Force Manpower function and the Navy Security Cooperation activity. Problematic is the scarcity of the manpower resource and funding. Increasingly, the military is doing more with less. Therefore, adding more work and responsibility on those that would fill key roles such as the *Leader* and *Facilitator* may be difficult. Further study is needed to explore innovative ways to fulfill these roles and responsibilities within existing resources.

Enabling Knowledge-Focused CoPs with Technology. In a knowledge-focused CoP, technology plays a supportive role. When the community is conceivably entirely a virtual community – where face-to-face interaction is not possible – technology plays an even greater role. This thesis did not examine in great depth the role, potential and design of a knowledge-focused CoP technology solution. For further study, research should be conducted to design an architectural reference framework that could be used for knowledge-focused Communities of Practice.

Implications of DoD Technology Standards on CoPs. Additional research is also required to examine the implications of emerging DoD wide technology standards on any type of CoP. For example, portal technology is emerging as a standard solution for DoD business enterprises. At present, each Service has their specifically developed enterprise level solution (AF Portal, Army Knowledge Online, and Navy Knowledge Online). Moreover, each one is expected to transition to a common DoD portal application and user interface in the near future (Defense Knowledge Online). A problem arises when these types of IT standards tighten the flexibility required to cultivate a knowledge-focused CoP. Such standards may force CoPs to fit into a standard technology solution, which may create problems for the long-term sustainment of knowledge based CoPs.

Assessing CoP Performance. This author could not find any work that offered practical methods for assessing the performance, beyond anecdotal feedback and subjective performance assessments, of a knowledge-focused CoP. This can be problematic for an emerging CoP if executive leaders seek to assess the value of the program and investments without performance measures. Further study should be conducted to discover or develop practical methods for assessing knowledge-focused CoP performance. Further study can also be conducted to compare the performance of knowledge-focused CoPs against that of information-focused CoPs.

C.   CONCLUSION

In conclusion, knowledge is an asset the Military should prize for its value in providing a capacity to act. Evidence suggests that this is not the case at any level of the Military organization (reference Chapter III, Section E). Further, there are mixed signals. For instance, there is a trend of misrepresenting information management as "Knowledge Management." Communities of Practice are also misunderstood. In the Air Force, this author determined that a CoP is primarily thought to be an information technology solution that enables information sharing. Missing is the appreciation of a CoP as a social undertaking. The point here is that knowledge is not easily understood, is often misidentified, and is indeed a challenge to leverage. Yet it is on the critical path to organizational performance. Therefore, it should be pushed up as a priority (above information management), sought to be understood and given a more prominent place in organizational strategy.

Presented in this thesis are compelling discussions that are primarily directed to the organizational leader. The message is: knowledge is power and a knowledge-focused Community of Practice is an approach to leveraging that knowledge. Referring again to the "Letter to Airmen" by the Secretary of the Air Force Michael Wynne (2007b), he calls all Airmen is to become "Knowledge-Enabled" and points to what Wilbur Wright once said:

   It is possible to fly without motors, but not without knowledge and skill

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APPENDIX A – KNOWLEDGE-BASED VIEW OF AN ORGANIZATION: STOCKS AND FLOWS
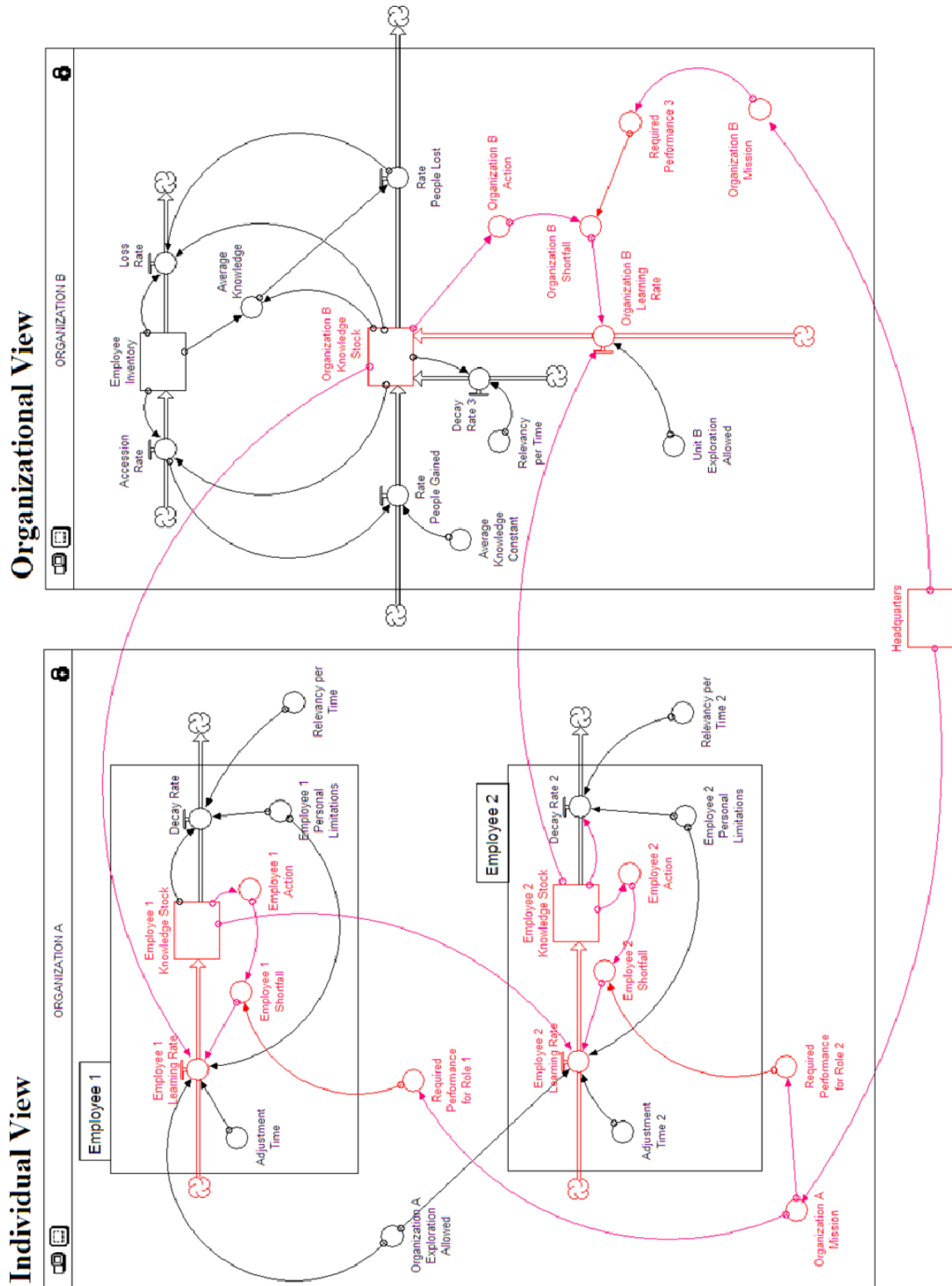
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APPENDIX B – THE AIR FORCE PORTAL

The AF Portal is found at https://www.my.af.mil. Military members, DoD civilians and contractors must register to gain access.

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APPENDIX C – AIR FORCE KNOWLEDGE NOW

AF Knowledge Now is accessed through the AF Portal. Screenshot retrieved on August 5, 2007.

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APPENDIX D – FINANCIAL MANAGEMENT COMMUNITY OF PRACTICE

AF Financial Management Community of Practice is accessed through the Knowledge Now web portal. Screenshot retrieved on August 5, 2007.

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APPENDIX E – COMPANY COMMAND COMMUNITY OF PRACTICE

The Company Command is accessed through Army Knowledge Online web portal. Screenshot retrieved on August 20, 2007.

APPENDIX F – SURVEY OF TECHNOLOGIES FOR A COMMUNITY OF PRACTICE

This presents a non-exhaustive survey of extant technology that can fulfill those practical functions summarized in Table 14 of Chapter IV, Section F.

Communities of Practice stand to benefit from technology if knowledge managers exploit its capability to fill the gaps created by a community extended by time and space. This can be better understood using a continuum that expresses the gaps that need to be resolved. Figure 20 provides a summary of this.
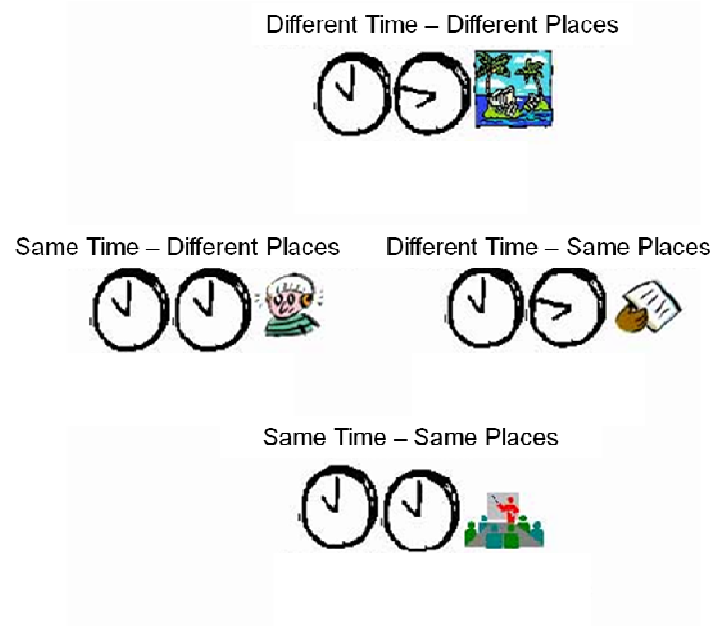
Figure 20.   The Time and Place Continuum (After: Wenger, White, and Rowe, 2005)

Information Technology is ubiquitous. Due to this, it is now seen less as a capital investment and more as a cost of doing business. Nicholas Carr (2003) agrees: "They [IT] are becoming costs of doing business that must be paid by all but provide distinction to none." Specific technology applications implemented alone in a KM program provide very little value for knowledge flow. After crossing the social design bridge, which must be done first and is discussed in Chapter IV, the knowledge manager must wade through a sea of ubiquitous technology to find applications that can be adopted and found useful

for a community of practice. The challenge is finding a solution of complementary applications that can support the social design and minimize confronting workers with the need to change their routines and ways of doing things.

The following survey serves to uncover only a few of the extant technologies that may help the knowledge manager design a program for a CoP. It is not exhaustive.

Traditional Communication. (Face-to-Face, Telephony, Voice Mail and Email) A technology solution to a knowledge management program must start with the existing information and communications architecture. It is hard to find knowledge workers that are not already well adapted to using face-to-face communication, telephones and email. Therefore, working through established media is a good start to support the KM program. For a CoP, these traditional modes of communication provide the foundation towards resolving the time and space extension between people: same time/same place (face-to-face), same time/different place (telephony), different time/different place (voice mail, email), different time/same place (email).

Peripheral Communication. (Video Conferencing, Chat, Instant Messaging) Some would consider these applications as traditional modes of communication due to their extended presence in social networking. However, in business they tend to serve as a secondary means of communication behind traditional modes and are typically not used as part of daily work routines. These applications would benefit the KM program for a CoP by supporting communication and addressing limitations with traditional communication. In particular, same time/different place (synchronous) communication is enhanced. Video, chat and instant messaging provide the community additional features that supports knowledge flow. Video adds a visual dimension that is useful for stimulating an added sense that is normally only captured during face-to-face communication. Chat and instant messaging supports enhanced group communication and normally includes features to save this synchronous communication for reuse or sharing.

Portals and Online Workspaces. (Internet Website) A community needs to have a front door leading into a place to work, to meet, to collaborate and to learn. Portals and online workspaces provide the CoP with a common environment accessible by all

members any time and from any place. Having a common work environment also provides the community with an identity that represents the relationship between its members and their interest. They serve as a platform to launch the other applications described in this survey and also to link one activity with others. A well designed internet website should have the capability to address each of the time and place gaps.

Knowledge Sharing. (Yellow Pages, Wiki, Blogs, Discussion Forums, RSS, FAQs) Knowledge sharing applications perhaps represent the current revolution in the evolution of the internet. It is referred to as web 2.0 and personifies a paradigm shift that is occurring "where collaboration and free speech reign and users are encouraged to network and form the content of the intranet [or internet] site." (Scarff, 2006). Yellow pages offer the CoP participant access to knowledge through knowledge maps and expertise profiles. Wiki applications allow any community member to edit community content anytime. Blogs and discussion forums allow CoPs to thematically communicate asynchronously. These are seen as conversations that have focus and where all can participate. Real Simple Syndication (RSS) and Frequently Asked Questions (FAQs) represent applications that offer additional means to find and receive information.

Online Instruction (eLearning). The flow of knowledge is important to a CoP. ELearning contributes to this by providing a cost efficient way of promoting knowledge flow in a more traditional manner. It has evolved from earlier versions (computer or web based training) where the technology was the central focus. Now, with eLearning the central focus is the content. Rollett (2003) points out several other benefits:

> Beyond technology issues, eLearning is also concerned with individual learning styles and instructional design, as well as with appropriate ways of employing eLearning. In particular, reaping the benefits of both traditional face-to-face instruction and eLearning by mixing them in a planned fashion is becoming ever more common.

CoPs stand to benefit from this application by having an easily accessible learning platform which guides members to a focused learning context relevant to the community's theme.

Knowledge Bases. (Document Repositories) Finally, document repositories are an essential element in a knowledge management program. These applications contribute

to a CoP by providing a place to instantiate information (written text, video and audio) into virtual warehouses for organization, formalization and sharing of information. This provides the community a means to reuse information toward supporting the flow of knowledge.

Figure 21 provides a summary of this discussion of extant technology useful for a Community of Practice addressing gaps due to the extension of time and space.
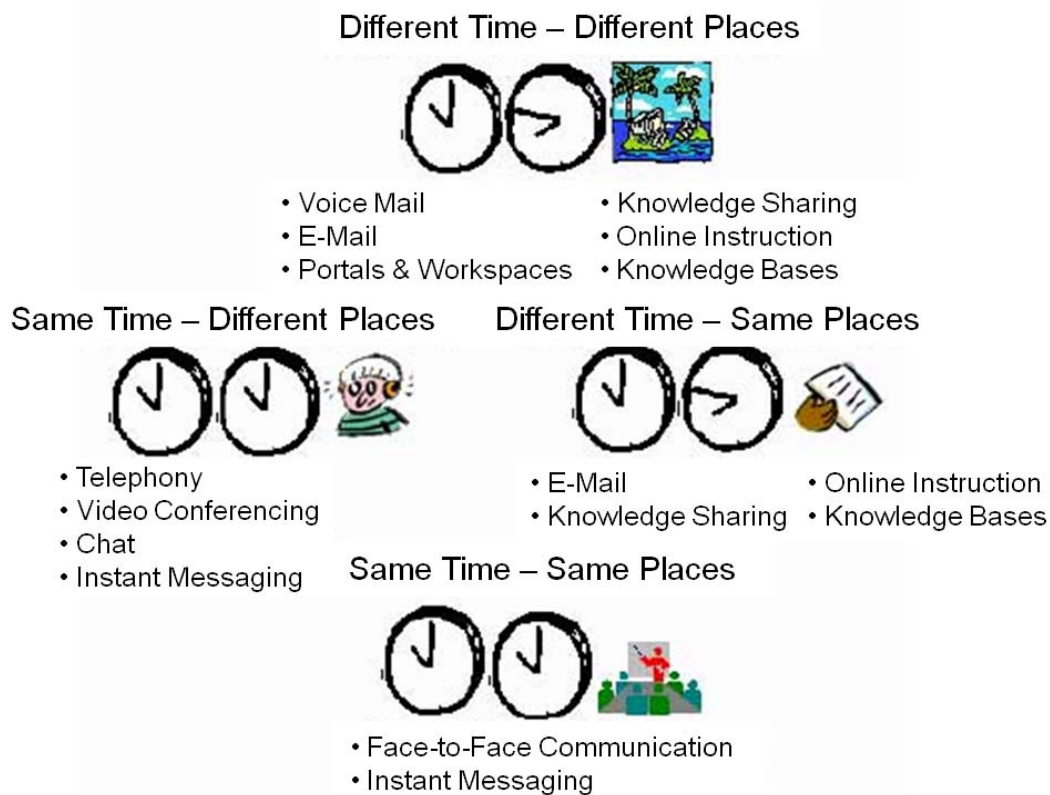
Figure 21.   Technology applications in the time and place continuum (After: Wenger, White, and Rowe, 2005)

At the product level, Entiene Wenger (2001) accomplished a comprehensive review of specific technology applications that are available in the market. He warns that not one product has everything for a community of practice, but many products have something. At Figure 22, Wenger places each of the products he evaluated in chart that situates each one in product categories – such as knowledge worker's desktop or discussion groups – that represent important dimensions of a community-based

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knowledge strategy. The chart also specifies the specific outcomes that should be sought from these categories; such as "ongoing integration of work and knowledge" for products in the "knowledge worker's desktop" category.   An arrow means that the system is moving toward supporting Communities of Practice.   He estimates that those products placed closer to the center, "Communities of practice," are most adaptable to CoP needs. This chart is provided to offer the reader an idea of the variety of applications on the market.
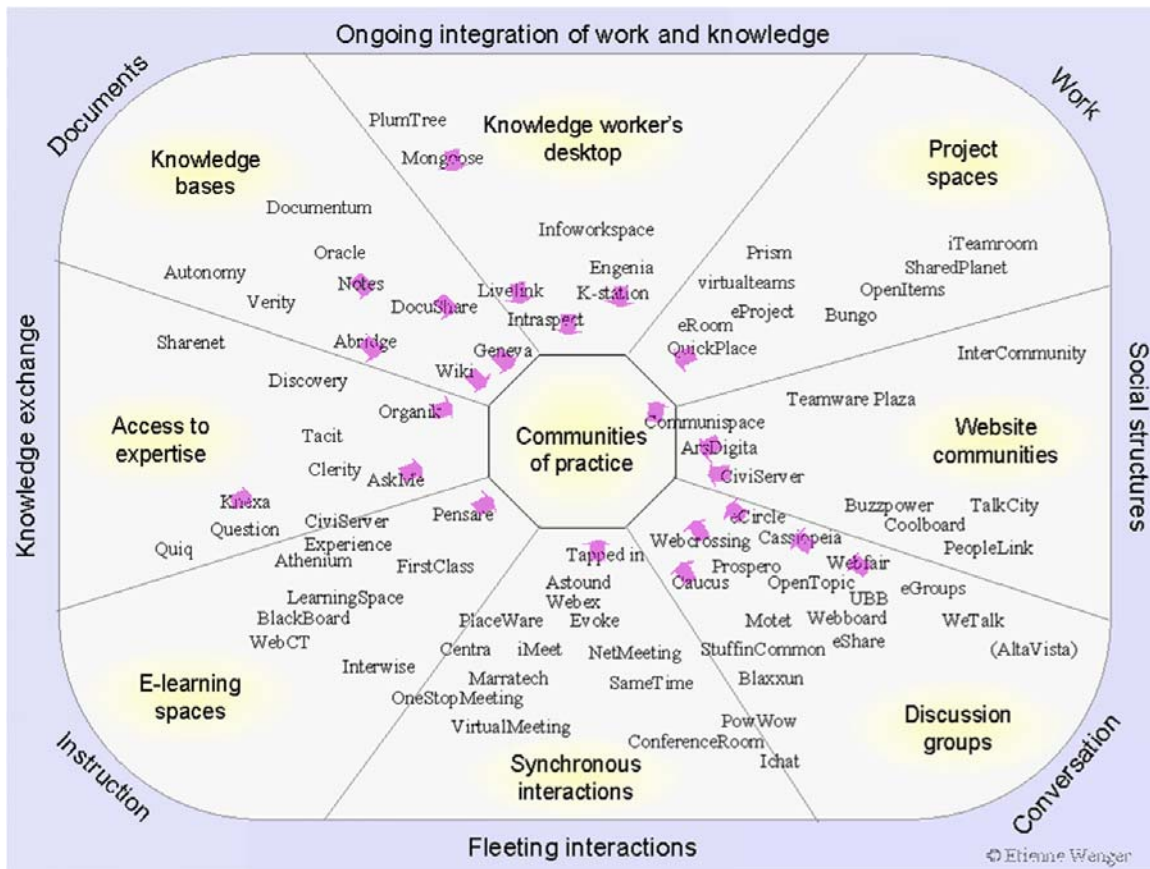

Figure 22.   Product chart of technologies for a Community of Practice (After: Wenger, 2001)

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APPENDIX G – MANPOWER AND PERSONNEL COMMUNITIES OF PRACTICE

This is a sampling of a few Communities of Practice registered through Air Force Knowledge Now (AFKN) and identified as "Manpower and Personnel." In total, there were 681 "Manpower and Personnel" CoPs of 8,908 found on AFKN; 27 were identifiable as used for a "Manpower" organization or activity. The first 15 CoPs are the most active (hits) of this group over the last 12 months. The proceeding 27 are the "Manpower" CoPs in their relative position (reference the numeration) within the list of 681 CoPs. Information was retrieved on September 9, 2007 from AFKN. The list is sorted by numbers of "Views" (hits) over the last 12 months.

CoP Name/Views last 12 mths/Date last modified (Since September 9, 2007)

1. HQ AFSVA Services 671,942   9/7/2007
2. AFMC Orientation Course 401,585   8/27/2007
3. Little Rock AFB Enlisted Professional Enhance 229,355   8/30/2007
4. Readiness Management Group COP 145,206   9/7/2007
5. Ramstein CPO (NSPS Training Registration & In 134,290   8/30/2007
6. USAF First Sergeants 106,778   9/7/2007
7. PSM 103,211   9/6/2007
8. WPAFB NSPS Training Registration 97,283   9/7/2007
9. RMG Restricted Access 90,555   9/7/2007
10. 88 MSS/DPC Civilian Personnel Flight (WPAFB) 78,753   7/31/2007
11. Robins AFB National Security Personnel System 74,066   7/20/2007
12. AFDW Directorate of Personnel 73,426   9/7/2007
13. Team Mildenhall Professional Development Cent 68,605   8/7/2007
14. ACC Squadron Commander & Spouse Course 67,727   9/5/2007
15. Langley Professional Development Center 65,093   9/7/2007
.
.
.
37. 66 MSS/MOF MANPOWER CoP 35,097   9/6/2007
48. HQ AFMC/A1M - Manpower, Org, and Resources Di 24,006   9/7/2007
89. AETC/A1MPR MANPOWER DATA WAREHOUSE 14,535   9/4/2007
104. AETC/A1M - MANPOWER AND ORGANIZATION 11,647   9/6/2007
117. HQ ACC/A1M Manpower and Organization Divi 9,337   8/29/2007
122. 2 Manpower Requirements Squadron Community of 8,839   8/15/2007
124. ESC Manpower CoP 8,641   8/21/2007
151. 350 Electronic System Wing (CISW) Manpower Co 6,666   9/7/2007
154. 5th Manpower Requirements Squadron (MRS) 6,591   8/22/2007

162. AFRC Manpower Programs Branch 5,967   9/7/2007
180. 653 Electronic System Wing (NCSW) Manpower Co 5,146   9/6/2007
205. Air Force Personnel/Manpower Leader Forum 4,050   9/5/2007
241. 374 MSS/MOF Mission Branch 3,061   8/7/2007
275. Brooks City-Base Manpower Office 2,442   8/2/2007
283. 37 MSS Manpower and Organization Flight 2,265   7/31/2007
295. Manpower Study Team Lead Forum 2,085   8/13/2007
302. 38 EIG Manpower CoP 1,904   8/30/2007
310. AFMA's Capability-based Manpower Standard (CM 1,839   5/3/2007
320. AFRC Manpower Standards 1,717   8/27/2007
338. AFMA - AF IDEA Program 1,380   8/10/2007
398. Vance AFB Manpower And Organization Flight 842   8/1/2007
423. JSTARS Manpower & Organization CoP 613   8/13/2007
438. 100 ARW/48 FW/501 CSW Manpower and Organizati 550   2/13/2007
447. AFRC Manpower Requirements Branch 517   8/27/2007
491. HAF/HR Manpower and Human Capital Management 333   8/17/2007
561. 4 MSS Manpower & Organization Flight 161   7/13/2007
610. Air Force Academy - MEO 80   9/4/2007

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